FOOD MANUFACTURE

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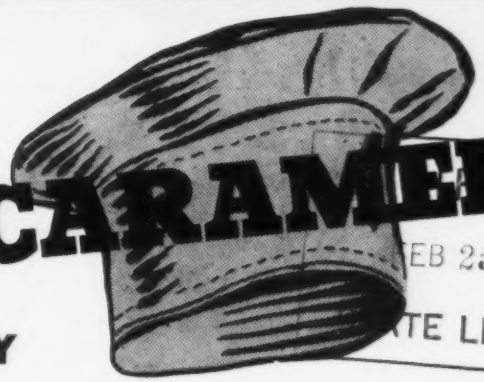
CLARK'S CARAMEL
IN THE BAKERY



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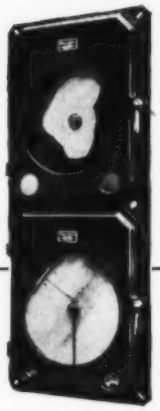

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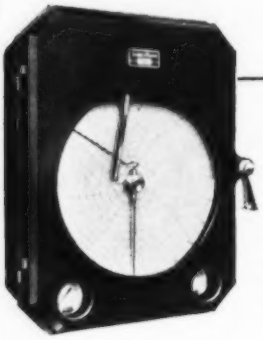

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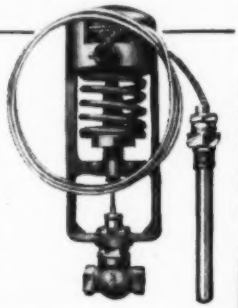

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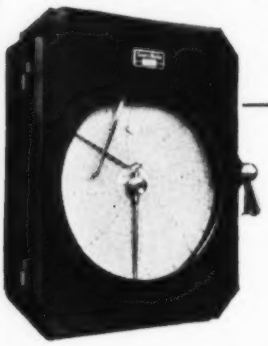

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FOOD MANUFACTURE

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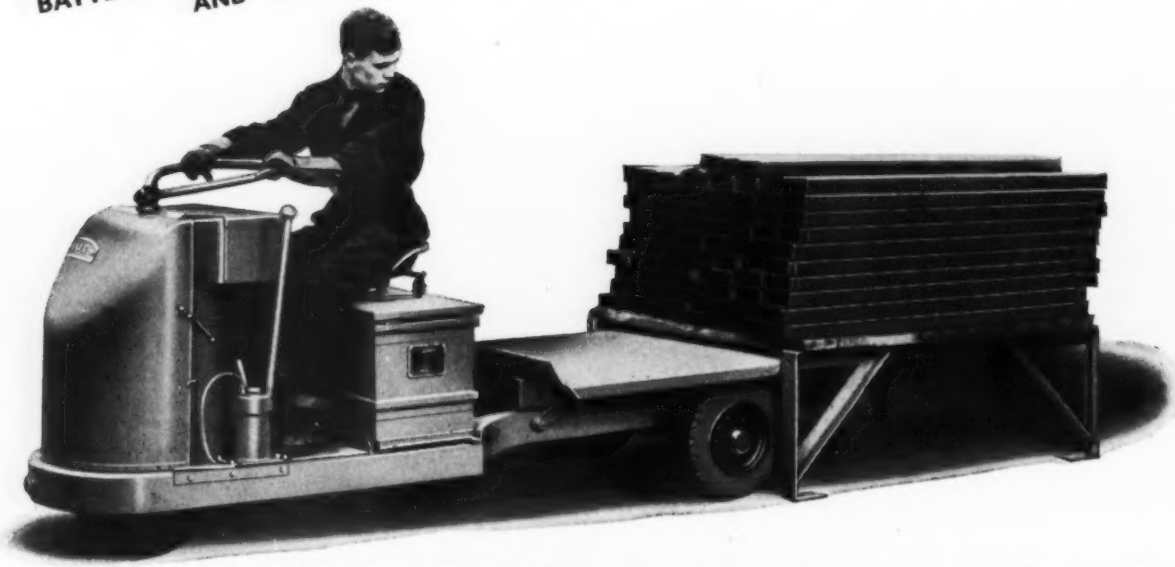

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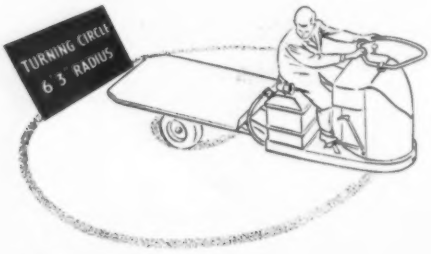

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Scottish-American Productivity

PLANS have been mooted by Lord Malcolm Douglas-Hamilton, M.P., for the creation of a Scottish-North American enterprise to revive fish and food production on the north-west coast of Scotland. Cattle ranching on a large scale, fishing industry developments, the erection of food processing and preserving plants to handle these products, and direct deep-water access for shipment of the produce are included in this scheme. Lord Malcolm is to visit America and Canada in the near future when he hopes to meet North Americans of Scottish descent with a view to formation of an organisation to handle the project.

While large scale cattle production has been proved successful, and the fishing industry has revived, thanks to the introduction of quick freezing and similar processing, the one thing lacking, because of high taxation, is finance, and it is in this connexion that Lord Malcolm hopes to obtain the necessary support during his trip.

The scheme has obvious attractions and the reaction of potential investors will be watched with considerable interest.

A Gap in Research

Too often it is assumed that chemical engineering is concerned solely with plant and processes for chemical substances. Its scope is in truth much wider—in the words of the Committee on Chemical Engineering (whose report was recently published by the D.S.I.R.) it is "concerned with the development, design, and operation of plants in which materials undergo a change in properties . . . it is now realised that most industries in a sense are chemical industries and that chemical engineering is not less important than mechanical and electrical engineering in servicing them."

The report has an appendix listing the special operations and processes on which fundamental research is badly needed and there are few that do not find a place in the food industry. Such operations as mixing, drying, distillation, washing processes, heat transfer, corrosion, effluent treatment, evaporation of heat-sensitive substances, the storing of viscous fluids, are all classified as fields of chemical engineering, and evidence given to the Committee has clearly shown that so far there has been some lack of investigation of the problems involved.

There is no centre or centralising organisation for chemical engineering research as a general branch of science. A number of universities have chemical engineering departments; most industrial research associations have developed their own chemical engineering sections. As a result of this *ad hoc* approach, little attention is paid to some of the problems, while in other cases research is apt to be duplicated. In the Committee's view this is one of the reasons why Britain, as a country, is slow to develop her own scientific discoveries. Manufacturing operations having their origin in Britain have often been developed or improved abroad with the tragic result that British manufacturers have been obliged to buy plant from other countries, or even operate, under foreign licences, processes which they themselves have initiated.

A grave weakness, to which the Committee's attention was drawn by the Director of Food Investigation, is that no facilities exist which enable the D.S.I.R. to carry their own research discoveries to the pilot scale stage.

The Committee, under Mr. H. W. Cremer's chairmanship, has presented a forthright report. It deserves the fullest support from industry; if it should lead to the formation of a national centre for chemical engineering research, few would benefit more than the food industry with its diversity and complexity of processing problems.

Antibiotics Accelerate Animal Growth

The great progress made in America in feeding poultry and cattle with antibiotic traces, particularly with aureomycin, is the subject of a report by Chapman Pincher (*Discovery*, **12**, 12, 377). Already the production of cattle food, with supplementary aureomycin to the extent of one part in 18,000, has reached an annual turnover of eight million dollars.

With table poultry, the normal 11 to 12 weeks' size is reached in nine weeks, although the final size of the birds is not increased. This hastening of the rate of growth is produced by an increased intake of food during the shorter period. A 15 to 31 per cent.

increase above the normal rate of growth has been demonstrated by experiments with pigs, and the actual saving of food is more spectacular. It is stated that as much as 130 lb. of pig meal can be saved per 100 lb. of pork produced. The loss of the usual undersized pig in each litter has been eliminated; fed with the aureomycin meal, these pigs quickly make up for their bad start and become nearly as large as the rest of the litter.

British research has confirmed these American results, but so far neither the Ministry of Health nor the Ministry of Food seem prepared to sanction the use of antibiotic traces in animal feeding. Fears have been expressed that resistance to disease, at any rate with poultry, might be weakened, although nothing that has so far occurred in the United States has supported this negative view.

The need for economy in pig and poultry food is more acute in Britain than in America. Moreover, despite the fact that aureomycin for the treatment of human ailments is urgently needed, our only plant is one for purifying the crude substance imported from America. U.S. manufacturers derive far more income from their by-products for cattle than from the sale of aureomycin for medical purposes. The British official attitude towards this twofold opportunity seems remarkably timid.

Sugar Beet Crop Breaks Records

At a time when maximum production from the land is a matter of the utmost importance, it is encouraging to read in the statement presented by Sir Alan Saunders, O.B.E., at the fifteenth annual ordinary general meeting of the British Sugar Corporation, of the valuable contribution made by the sugar beet crop.

Not only was the 1950 beet crop the largest in total tonnage ever grown in Great Britain, but the production of roots per acre was 17½ per cent. higher on average than in any previous year. A further matter for congratulation is the excellent quality of the roots both in regard to sugar content and purity of juice.

Greater mechanisation is no doubt in part responsible for this satisfactory state of affairs; in 1950 something like 15 per cent. of the total acreage of beet was harvested mechanically by the 3,000 machines in operation, and plans are being made for rapid expansion in this direction.

Processing operations are also to be subjected to considerable modernisation to increase efficiency and to eliminate unpleasant process work. One new continuous diffuser operated successfully during the season under review and better working conditions have resulted from the use of continuous filters in place of filter presses.

The installation of new equipment, including automatic controls and labour-saving devices, is proceeding apace; several of the Corporation's factories are shortly to be equipped with new continuous extraction plants. High pressure boiler plants are also to be installed to effect further economies in the use of fuel.

Other aspects of the work of the Corporation were mentioned by Sir Alan; of particular interest was the research work carried out on packaging and transportation. Activities in the transport of raw sugar in bulk resulted in economies in costs and dispensed with the use of sacks, of which there was a national shortage.

Evidently the Corporation is determined that there shall be no resting on laurels; their comprehensive plans for future development and reconstruction make this abundantly clear.

A Valuable By-product from Whales

Norwegian whaling expeditions last year brought back considerable quantities of whale pituitary glands from the Antarctic, which an Oslo manufacturing company has since converted into ACTH. The whaling company and the manufacturers have now donated a quantity of ACTH, corresponding to 625,000 international units and worth about £20,000, to Norwegian hospitals for research.

Hitherto, ACTH has chiefly been made in the United States using, for the most part, pituitaries from pigs. As these are extremely small, the manufacturing cost is very high.

During the last whaling season not only Norwegian but also British and South African expeditions to the Antarctic co-operated in collecting the raw material; a further supply is to be collected in the season which started in January.

Industrial Legislation

The Supplies and Services Legislation gives the Government power of control over both industry and individuals, but the principal Act of 1945 (there are two amending Acts, one in 1947 and the other in 1951) laid down that the legislation was to run only for five years, from December 10, 1945, to December 10, 1950, with a proviso that if considered necessary its operation could be continued for yearly periods by the issue of an Order in Council. One Order in Council has already continued the legislation until December 10, 1951, and recently another has further continued it until December 10, 1952.

The *modus operandi* of this legislation is to take certain Defence Regulations of the war-time Acts and turn them into Orders in Council. There are about 100 of these Orders, but the one which need be mentioned here is No. 55, General Control of Industry, as this gives power of control over everything relating to industry, trade, and individuals.

It is a continuation of Parts III, IV, and some of Part V of the Defence (General) Regulations, 1939.

Part IV covers industry generally, giving the Government power to regulate or prohibit the production, treatment, keeping, storage, movement, transport, distribution, disposal, acquisition, use, or consumption of articles of any description. Under Part III come ships, aircraft, and control of trade by sea.

These Orders cover, among other things, such matters as limitation of supplies, licensing, rationing, etc., of production and of raw materials, and so forth, the rationing of food, the points system, the control of building operations, and civil engineering contracting undertakings. The powers retained also include the direction of labour and the taking over of individual companies; this power does not extend to the nationalising of whole industries.

The new Government have stated that they intend to review all these Orders and Regulations, to see if some cannot be removed, and to include in actual Acts others which it may be considered useful to retain.

Food Bacteriology

Among the papers of interest to the food industry read at the annual general meeting of the Society for Applied Bacteriology was one presented by Dr. James Shewan and his colleagues, of the Torry Research Station, which dealt with some aspects of the bacteriology of marine fish.

The taxonomy of the groups present in marine fish is one of great difficulty, and a comprehensive study of these groups is at present being carried out. It has been found, for example, that it is very necessary, in order to explain different rates of spoilage in the same fish caught at the same time and handled and stored under identical conditions, to know not only the number but also the types of bacteria present.

The three main families of bacteria found are Achromobacteriaceae, Pseudomonadaceae, and Micrococcaceae. The important species in these groups also show certain common characteristics, namely, capacity for growth in low concentrates of organic nutrients, enhanced growth on solid surfaces (presumably owing to increased concentrates of organic nutrients on the solid surfaces), fairly low optimum temperatures (20°-25° C.), and marked heat sensitivity; they are actively proteolytic and usually weakly saccharolytic. Some have rather unusual biochemical characteristics, for example, liquefaction of agar, digestion of chitin, and reduction of trimethylamine oxide; a few are luminescent.

Some indications of an essential difference between whale flesh and more normal (horse) flesh were forthcoming as a result of experiments carried out by Dr. M. Ingram (Cambridge) which have shown that the anaerobic bacteria (*Cl. welchii* type A) which occur naturally in whale flesh do not begin to develop actively until the muscles have passed through *rigor mortis*. This effect was not observed in horse flesh, whether it was incubated anaerobically with *Cl. welchii* as in the whale or aerobically with species of Pseudomonas.

Two new experiments made by Mr. H. Barkworth (Derby) showed that the reduction time of methylene blue in milk diminishes with storage time, but this relationship ceases, or at least is seriously modified, when the reduction time has fallen to 30 minutes.

It was suggested that these results cast suspicion on the value of any routine methylene blue test with an original reading of 30 minutes or less, and since in the majority of cases tubes are read only at half-hourly intervals this means that any original reading less than one hour is of doubtful value.

The Juice of the Apple

A valuable study of the composition of English apples and their juices has been published in the *Journal of the Science of Food and Agriculture*, 1951, **2**, 11 (November). For five seasons many batches of market varieties, mainly from Kent, Surrey, Worcestershire, and Sussex, have been analysed, a monumental task carried out by Audrey Ayres and Pat Fallows in the laboratories of H. W. Carter and Co. Few in the fruit products industry will need to be told that the conception of this research must be attributed to Dr. V. L. S. Charley. It is typically generous of those concerned that they have not hesitated to make generally available all this previously non-existent information about Britain's major fruit crop.

A wide variation in the composition of apple juice occurs according to the variety of apple, and in the same variety the influence of seasons and cultivation conditions is considerable. No single constituent can be picked out to serve as a standard for the natural juice content in processed juice products.

The apple's vitamin C content is still being investigated and further results are promised, but it has at least been shown that the old view that apples are generally insignificant sources of this vitamin has been disproved. The content varies from almost nil to 30 milligrammes per 100 grammes; whole apples may contain as little as 1·6 or as much as 22·4 milligrammes. Among the varieties the Woolbrook Russet would seem to hit the highest levels most regularly, with Bramley Seedlings sometimes giving better-than-average figures. Such findings may be of more practical and immediate value to variety breeders than they are at present to the private or commercial buyers of apples.

A New Citrus By-product

Vitamin P from citrus hull juice molasses is being produced at the rate of 50 lb. a day in Florida. The existence of the vitamin in these industrial wastes is of potential importance, the present production being merely a pilot scale exploration. The British Commonwealth has its own citrus fruit industry; some enquiry into vitamin P production possibilities would therefore not be untimely. As for Britain herself, the blackcurrant crop is a generous source of vitamin C and research in the earlier phases disclosed the presence of vitamin P in that fruit.

The action of the "permeability vitamin" is well-known but this fairly new discovery has taken it out of the medicinal oddment class. It gives increased resistance to the harmful effects of atomic or X-ray radiation, as animal tests have shown. This may be owing to the fact that internal haemorrhages are common and dangerous features of radiation sickness.

This does not mean that the demand for vitamin P is restricted to its use in war. The peaceful utilisation of atomic energy and fission materials is steadily progressing at the atomic research centres. In time the wider use of radioactive materials is inevitable and many more workers will have to learn how safely to handle them.

It would be too optimistic to suppose that there will not be some incidence of radiation sickness, and diet fortification with vitamin P might become an important contribution in any general precautionary system.

An Irish Frigorifico

An interesting project to be known as Frigorifico of Ireland, which aims at the creation of a system similar to that operated in the Argentine, has been announced.

Although complete details are not yet available, we are informed that the intention is to establish the most modern unit of its type in this part of the world and to slaughter, handle, and hold carcasses for export to the meat-buying countries interested in Irish production. The new plant is to be located in Dublin and will have the aid of experts in each department. The plant will employ about 100 workers and is expected to go into operation in the spring.

There are a number of problems involved. Store cattle have come from Ireland for many years; whether this trade will continue is uncertain. Furthermore the import of live Irish cattle at Scottish and English ports created a substantial business in offal which will now be lost to the U.K. trade. The reverse side of the picture is that stock will be handled in better conditions than might be the case after a sea crossing.

The development of the scheme is being watched with considerable interest.

Nitrogen Packaging for Foods

The principles of nitrogen packaging in flexible film were outlined in a paper presented by W. S. Walker, of the Linde Air Products Co., New York, at the Eleventh Annual Meeting of the Institute of Food Technologists (*Food Technology*, **5**, 12, 1951).

Transparent films can be used without fear of daylight exposure, since ultra-violet light cannot catalyse oxidative reactions unless oxygen is present. It also gives excellent water-vapour protection and, in some cases, makes unnecessary the use of refrigeration or antioxidants, or both.

Among the food products which have benefited from the use of nitrogen during processing or packaging are those containing edible oils in one form or another or those which are cooked in oil or fats.

The results obtained from the study of the effects of storage atmosphere on the stability of freshly roasted peanuts also apply to other oil or fat-containing products.

The samples were stored at room temperature under normal daylight exposure for a period of several weeks. The nitrogen packaging maintained a zero peroxide number for a period of ten weeks, whereas the air pack control samples held a non-rancid shelf life for a period of four weeks.

A Daniel come to Judgment

At the annual conference of the North Western Federation, Lancashire and Cheshire bakers heard some hard words from Mr. Albert R. Daniel, head of the Bakery Department at Manchester College of Technology.

Mr. Daniel and his colleagues had been out shopping in the district and brought the purchases along to the meeting. Holding up some vanilla slices, he said: "They are selling at 3d. each and weigh two ounces. I would not put my teeth into the filling if you paid me a shilling." He had "nearly fainted" when first he saw some "fancies."

Heaping Pelion on Ossa he declared that a victoria sandwich ("a filthy piece of work"), Viennese tarts, macaroons, and Eccles cakes were all "rubbish." Some good pastry was also exhibited, but a Blackburn confectioner said it could not be done at the price. Also that the awful array of confectionery displayed was "a war-time legacy"—a phrase which has a strangely familiar sound!

Mr. Daniel is not the first person to complain about pastry. It was Dickens who first made fun of the rock bun with his "highly geological cake," the same Dickens who wrote of pastry that "aggravates a man instead of pacifying him."

And now we have a present-day critic who dares to be a Daniel among the bakers.

Soft Drinks at Portslade

From its small beginnings in 1874 when Robert Fry began the manufacture of aerated waters at premises in Brighton, the company of R. Fry and Co. has expanded into a large organisation with headquarters at Portslade, and other factories and branches at Camberley, Eastbourne, Guildford, Hastings, Horsham, Staines, Tunbridge Wells, and Reading.

IT WAS in 1881 that Mr. R. Fry was joined in partnership by Mr. Edwin A. Wallis, the father of the present chairman of R. Fry and Co., Mr. Clifford H. Wallis. Fourteen years later, the firm was formed into a limited liability company and a working alliance was made with Ingram and Royle, importers of Continental natural mineral and medicinal waters.

This alliance paved the way for still greater expansion of trade until the activities of the Brighton factory had become so cramped that it was necessary to find larger premises.

Plans were therefore drawn up for the erection of a new factory and administration headquarters at Portslade; this was officially opened on May 2, 1930.

Further expansion took place after the World War II when two more mineral water factories were bought, one at Guildford, which is now a subsidiary company trading under the name of Purnell and Co., and the other at Camberley.

The company's present activities embrace the production of fruit squashes, non-alcoholic wines, carbonated beverages, and soda water, in addition to the manufacture of such dry goods as lemonade powder, jelly crystals, and custard powder.

The sugar boiling department, showing the three stainless steel pans used for dissolving the cane sugar for the preparation of syrup.

Dry Goods Section

For the manufacture of jelly crystals and lemonade powder, which is dependent upon the availability of sugar supplies and which forms a side line to the company's main activities of soft drinks production, predetermined amounts of the basic ingredients, together with colouring and flavouring materials, are fed into the mixing machine. The mixing operation occupies approximately five minutes, after which the powder is fed into containers placed below the outlet pipe of the machine and conveyed to the next department for packing prior to despatch. For jelly crystals, the finished product is put up into 4 oz. packs and then cartoned. Lemonade powder is packed in 7 lb. tins.

The finest Canadian wheat flour is used in the manufacture of custard powder. In this instance, the basic ingredients undergo a sifting and mixing process, the former operation removing any extraneous materials, such as sack fibres, from the flour. After the addition of colouring and flavouring agents the powder is packed ready for distribution. The filling and packing operations in this department are carried out by hand.

In addition to the production of

The air-conditioned syrup room.

A particularly attractive pack has been devised by the company for their cordials. This takes the form of a decanter which is corked by hand and then packed into cartons with glass stopper attached to the neck.

Above: After filling, the bottles of squash are passed through the labelling machine which is capable of handling up to 90 dozen bottles per hour.

Left: Four-head vacuum fillers are used for squash. After closure by means of a screw top, the bottles are "sighted" before passing to the labelling machine.

these goods, such commodities as essences, colourings, and flavourings are prepacked in this section.

Squash Manufacture

Pure fruit juice is one of the main ingredients of the squashes manufactured by the company. South Africa, the Mediterranean countries, and Portugal are the principal sources of supply for the juice which, on arrival in Britain, is conveyed in 20 and 40 gallon casks to a central pool from which the requirements of all manufacturers are met.

The other main ingredient, sugar, comes to the factory by road. On arrival, it is conveyed by electric hoist, four sacks at a time, each weighing 2 cwt., to the sugar boiling room.

To make up the syrup, varying amounts of sugar, according to the type of syrup being made, are fed into the stainless steel steam jacketed pans containing boiling water, each of which has a capacity of 70 gallons. Stirring with a wooden paddle takes place until the sugar has completely dissolved. The syrup is then fed by glass pipelines to the syrup room below, where it passes through a cooler, is filtered, and pumped into the battery of stainless steel pans, each with a capacity of 225 gallons.

The syrup room is one of the factory's more recent acquisitions, having been opened officially on May 1, 1951, by Lt.-Col. Sir Cyril Jones, C.B.E., Vice-President of the Federation of British Industries and past President of the Food Manufacturers Federation. Designed by members of the company's staff, this room is air-conditioned and hygienically equipped.

At this stage the fruit juice, together with acid, flavouring, and colouring matter, is conducted through glass pipelines to the syrup pans. Its specific gravity is checked by means of a hydrometer, and, if adjustment by water addition is needed, this is fed into the tanks by pipeline from the sugar boiling room above.

Before the syrup passes to the bottling lines, samples of each batch are taken and tested in the laboratory.

Production of Cordials

For the production of cordials, the syrup is prepared in the same manner as for the squashes and is then conveyed to the syrup room for the addition of other ingredients and final filtering. Samples are also taken as before and tested before bottle filling operations proceed.

On arrival at the production floor, the empty bottles are conveyed by runways to the bottle washing machines which remove old labels and wash the bottles under pressure both inside and out. Before passing to the filling machines, all washed bottles are subjected to further inspection, or "sighting," to ensure that the bottle washing operation has been satisfactorily completed.

For squashes or cordials, the sterilised bottles are conveyed to four-head vacuum fillers, then closed by means of a screw top. Further sighting of the filled bottles takes place before they are conveyed to the labelling machine, which is fully automatic and capable of handling up to 90 dozen bottles per hour.

The filled bottles are then packed in cartons and conveyed to the despatch department where they are stacked to await transport by the fleet of vehicles.

A particularly attractive pack has been devised by the company for the packaging of cordials. This takes the form of a decanter which is corked by hand and packed into cartons with the glass stopper attached to its neck.

Twenty-four head filler for pint bottles in action.

For filling, syphons are placed in the filling machines in an inverted position.

Carbonated Drinks Production

The manufacture of aerated soft drinks of many flavours is brought about by a mixing of water charged with carbon dioxide and measured doses of flavoured syrups. Empty bottles are fed to a fully automatic combination of machine units comprising a washer, syruper, filler, and either crown corking or stoppering units connecting with a labeller. The combination is capable of an output of 300 dozen per hour of small size bottles, or 240 dozen per hour of the larger bottles.

On leaving the washing unit, the bottles are carried on a metal conveyor belt, and each in turn is fed to the syruping unit by means of a star wheel. The syruper is designed to permit only a measured amount of syrup to enter each bottle before it is taken forward to receive its filling of carbonated water from the filler. Once again the filled bottles are automatically returned to the conveyor belt, and proceed to a device where they are either crown corked or screw stoppered, this operation being followed by mechanical labelling. The bottles are then examined, placed into crates, and sent to the stock stacks ready for loading.

Soda Water Production

Slate tanks, each of 200 gallons capacity, used for the production of soda water, are charged with water containing bicarbonate of soda, which is then passed through the carbonating plant and thence to the filling department.

Empty syphons are first soaked and washed externally, there being no need for internal washing as valve of the syphon precludes the entry of any dirt. For filling, the syphon is placed in the filling machine in an inverted position, the syphon valve being automatically depressed, thus permitting soda water from the filling pump to pass into the syphon until the imprisoned gas prevents the entry of further soda water. At this stage the syphon is not completely filled and contains a residual mixture of gas and air which it is necessary to replace by water. The gas and air are allowed to escape into a container under low pressure, thus allowing the filling operation to proceed. This operation is called "snifting."

The filled syphons are then sighted and passed to the cleaning table where the metal tops receive a final polish. After the neck label has been affixed, a paper cap is placed over the whole of the metal top.

Syphon Manufacture

R. Fry and Co. are one of the few manufacturers of soda water in Britain to make their own syphons, the tops being made and assembled in their workshop. Vases of 30 oz. and 40 oz. capacity are imported from Czechoslovakia, and the metal used for the tops is a tin and antimony alloy. The molten alloy is poured into moulds for making up the various parts, for example, the body and split rings. The body is sent to the company's engineers' shop, which is also situated on the premises, where it is turned to ensure complete smoothness. After being chromium plated, the rest of the parts are fitted and the whole is assembled, together with the glass syphon tube to make the finished syphon.

Before these are finally passed to the filling machines, they are tested by filling with ordinary carbonated water and left for approximately three days. If during that time there is any tendency to leak, the syphons are returned for repair; otherwise, they are emptied and passed to the fillers and thence to the despatch department.

Loading Arrangements

All cases of bottled goods are stacked into the various flavours

and sizes of bottles in the loading bays; this facilitates the assembly of orders and the loading of delivery vans. The majority of the orders are first received from the area representatives and then sent to the various branches for redistribution.

Export Trade

The company's products are exported to 29 different agencies all over the world, with the exception of Australia, America, and the U.S.S.R. and her satellites. Squash destined for the export markets is packed into reinforced containers, one dozen to a case, and wire strapped prior to shipment.

Work of the Laboratory

Analytical control both of the raw materials as received in the factory and of the finished products is carried out in the laboratory. Another of the functions of the laboratory staff is to investigate any complaints that may be received after the product has passed through the usual retail channels.

Experimental work is also carried out in connexion with the preparation of new products; one of these was a drink called Frycola which was marketed during the Festival of Britain.

Ancillary Departments

In the three and half acres of factory space are included maintenance shops for the company's vehicles; engineering works for the maintenance of plant; an electrical department for carrying out repairs to lighting installations and for maintaining the Diesel generator, the latter having been installed to ensure that the production of the factory is not interrupted during power cuts; a carpenter's shop for the repair of cases and for the manufacture of exhibition stands and counters; and a well-appointed canteen, with rest and recreation rooms for the office and factory employees.

The company also has its own printing department in which is prepared a wide range of sales pamphlets, stock labels, and other items for use in the factory.

The key to the efficient running of both the factory and administration departments is the use of mechanisation wherever possible. This, coupled with well designed layout in all sections of the factory, promotes the high standards of hygiene and efficiency of which the company is justly proud.

SUPPLIERS OF EQUIPMENT

Labellers: *Purdy Patent Machinery Co.*
Agitator and boiling pans: *W. P. Butterfield.*
Filtration: *The Metafiltration Co.; Berkefeld Filters and Water Softeners.*
Fillers for squash: *Albro Fillers and Engineering Co.*
Cooler: *S. Briggs and Co.*
Carbonating plant: *George S. Clayton; Hayward-Tyler and Co.*
Bottle washer: *British Miller Hydro Co.*
K.S.U. filler: *George S. Clayton.*
Triplex filler: *Hayward-Tyler and Co.*
Generating plant: *Davey, Paxman and Co.*
Boilers: *Penman and Co.*
Powder sifting and mixing machines: *Wm. Gardner and Sons (Gloucester).*
Carbonating pump: *W. Meadowcroft and Son.*
Water softening plant: *Permutit Co.*
Stainless steel pans: *The A.P.V. Co.*
Electric hoist: *Herbert Morris Ltd.*
Cartons: *Boxfoldia.*
Vehicles: *Bedford; Vauxhall Motors.*
Bottles: *United Glass Bottle Manufacturers; Forster's Glass Co.; The Canning Town Glass Works; Redfearn Bros.*
Colour, flavours, and essences: *W. J. Bush and Co.; A. Boake Roberts and Co.; Stevenson and Howell; White, Tompkins, and Courage.*
Weighing machines: *W. and T. Avery.*
Glass pipelines: *James A. Jobling and Co.*
Pumps: *Mono Pumps; G. and J. Weir.*
Balances: *L. Oertling.*
Incubators: *A. Gallenkamp and Co.*
Refractometer: *Bellingham and Stanley.*
Microscope: *C. Baker (of Holborn).*
Capping machines: *Metal Closures.*
Gas cylinders: *The Carbon Dioxide Co.; John Bennett Lawes and Co.*
Syphon filler: *Barnett and Foster.*
Electric motors: *English Electric Co.*
Lighting: *Crompton Parkinson; General Electric Co.; Siemens Electric Lamps and Supplies.*
Strapping machine: *Seal-less Strappings; Signode.*
Cans: *The Metal Box Co.*
Conveyors: *Rownson Drew and Clydesdale.*
Air conditioning installation: *G. N. Haden and Sons.*

Greetings Acknowledgments

FOOD MANUFACTURE acknowledges with thanks, cards, calendars, diaries, etc., received from the following: F. J. Edwards; Geo. Cohen, Sons and Co.; Lintas; Glaxo Laboratories; Wennergren-Williams A.B. (Stockholm); Batchelors Peas; J. Valentine Backes (Ch. Goldrei, Foucard and Son); Evans Chemicals; Norman Evans and Rais; Thos. Broadbent and Sons; John Peck and Co.; Pearlite Box Co.; Oppenheimer Casing Co.; Fred Smith; John Morrell and Co.; Blackburn Corrugated Paper Co.; Gillman and Spencer; Courtaulds; Boxfoldia; Rose Bros.; Polak and Schwarz; "L'Arte Bianca" (Italy); Alite Machines; R. Oldenbourg Verlag (Germany); Fishing Industry Research Institute (South Africa); Fructexport (Bucarest); American Society of Bakery Engineers; The Farmers Marketing and Supply Co.; Practical Etching Services; Billing and Sons; Mono Pumps; W. J. Bush and Co.; F. J. Lyons; Benjamin Electric; James H. Randall and Son; Process Blocks; D. P. Hopkins; Knighton and Cutts; The Metal Box Co.; T. Wall and Sons; Batchelor and Co. (Ireland); Coates Bros. Inks; Hyde and Partners; Samuel Jones and Co.; Basil C. de Guerin; Eric N. Davis; Clover Meats (Ireland); E. Vincent Lawes; Lever Bros. and Unilever; E. F. Leak and Co.; Vera E. Seymour; T. Sparre (Norway); Frank H. Slade.

New Books Register

Orders for any of the books listed below, or scientific and technical books in any language, may be placed with the Books Department, FOOD MANUFACTURE, *17, Stratford Place, London, W.1. A selected stock of books is carried and may be inspected at the above address. Prices given do not include postage.*

Cruickshank, E. W. H. *Food and Nutrition.* E. and S. Livingstone, Edinburgh. Pp. 454. Illustrated. 30s.

Scientific and Industrial Research Department of Water Pollution Research. Report of Board with Director's Report, 1950. H.M.S.O. London. 1s. 6d.

Elliott, A. and Dickson, J. H. *Laboratory Instruments: Their Design and Application.* Chapman and Hall, London. Pp. 414. Illustrated. 32s.

Year Book of the Heating and Ventilating Industry, 1951. Technitrade Journals, London. Pp. 284. Illustrated. 7s. 6d.

Ministry of Food

LATEST STATUTORY INSTRUMENTS

The list given below is the continuation of the list of Instruments published in "Food Manufacture," October 1, 1951, page 392.

No.	*Date 1951.*	
		PRICE FIXATION
1623	Sept.	9. Order revoking the Table Jellies (Maximum Prices) Order, 1946.
1689	,,	23. Order amending the Eggs (Great Britain) Order, 1950, and the Eggs (Northern Ireland) Order, 1950. Revokes S.I. 1951, No. 1510.
1722	Oct.	1. Order amending the Condensed Milk Order, 1951.
1755	Nov.	25. Order amending the Flour Confectionery Order, 1951.
1843	Oct.	18. Order amending the Eggs (Great Britain) Order, 1950, and the Eggs (Northern Ireland) Order, 1950. Revokes S.I. 1951, No. 1453.
2037	Dec.	1. Order amending the Feedingstuffs (Prices) Order, 1951.
2038	,,	1. Order amending the Wheat (Great Britain) Order, 1951, and the Wheat (Northern Ireland) Order, 1951.
2039	,,	1. Order amending the Oats (Great Britain) Order, 1950, and the Oats (Northern Ireland) Order, 1950.
2040	,,	1. Order amending the Dredge Corn (Great Britain) Order, 1951, and the Dredge Corn (Northern Ireland) Order, 1951.
2065	,,	1. Order amending the Milk (Control and Maximum Prices) (Great Britain) Order, 1951. Revokes S.I. 1951, No. 1490.
2066	,,	1. Order amending the Milk (Control and Maximum Prices) (Northern Ireland) Order, 1951.
2067	,,	2. Order amending the Chocolate, Sugar Confectionery, and Cocoa Products Order, 1951.
2143	,,	6. The Eggs (Great Britain) Order, 1951. Revokes S.I. 1950, Nos. 1661 and 1958; and S.I. 1951, Nos. 426, 845, 1689, and 1843.
2144	,,	6. The Eggs (Northern Ireland) Order, 1951. Revokes S.I. 1950, Nos. 1662 and 1958; and S.I. 1951, Nos. 426, 845, 1689, and 1843.
2198	,,	16. Order amending the Flour Order, 1951.
		CEREAL FILLERS
1656	Sept.	16. Order amending the Cereal Fillers Order, 1951. Revokes S.I. 1951, No. 580.
		DRIED FRUITS
2068	Dec.	9. The Dried Fruits (General Licence) (Revocation) Order, 1951. Revokes S.I. 1951, No. 516.
		EGG PRODUCTS
1781	Oct.	7. Order amending the Egg Products (Control and Maximum Prices) Order, 1946.
		FISH AND FISH PRODUCTS
1624	Sept.	9. Order revoking the Fish and Fish Products (Control of Packing) Order, 1942.
		HORTICULTURAL CONTAINERS
1723	Oct.	1. The Fruit, Vegetables and Flowers (Returnable Containers) Order, 1951. Revokes S.R. & O. 1944, No. 87; S.R. & O. 1946, No. 1802; S.R. & O. 1947, No. 1928; and S.I. 1948, No. 79.
	1952.	INVERT SUGAR
2244	Jan.	1. The Invert Sugar Order, 1951. Revokes S.R. and O. 1943, No. 1706, and 1947, No. 742.
	1951.	INFESTATION
2157	Dec.	9. The Infestation (Northern Ireland) (Revocation) Order, 1951. Revokes S.R. and O. 1943, No. 680.
		POTATOES
1724	Oct.	1. The Ware Potatoes (No. 2) Order, 1951. Revokes S.I. 1951, No. 1349.
1926	Nov.	15. The Seed Potatoes Order, 1951. Revokes S.I. 1950, Nos. 1236 and 1962; and S.I. 1951, No. 289.
2169	Dec.	11. Order amending the Ware Potatoes (No. 2) Order, 1951.
		RATIONING
1505	Aug.	19. Order amending the Meat (Rationing) Order, 1951.
1556	,,	26. Order amending the Meat (Rationing) Order, 1951. Revokes S.I. 1951, No. 1505.
1622	Sept.	9. Order amending the Fats, Cheese, and Tea (Rationing) Order, 1951.
1633	,,	9. Order amending the Meat (Rationing) Order, 1951. Revokes S.I. 1951, No. 1556.
1652	,,	16. Order amending the Bacon (Rationing) Order, 1951. Revokes S.I. 1951, No. 1328.
1655	,,	16. Order amending the Meat (Rationing) Order, 1951. Revokes S.I. 1951, No. 1633.
1693	,,	23. Order amending the Meat (Rationing) Order, 1951. Revokes S.I. 1951, No. 1655.
1703	,,	30. Order amending the Food Rationing (General Provisions) Order, 1951.
1854	Oct.	21. Order amending the Meat (Rationing) Order, 1951. Revokes S.I. 1951, Nos. 1312 and 1693.
1921	Nov.	11. Order amending the Meat (Rationing) Order, 1951.
2007	Dec.	2. Order amending the Bacon (Rationing) Order, 1951. Revokes S.I. 1951, No. 1652.
2204	,,	16. The Meat (Rationing) (Directions) Order, 1951.
2213	,,	30. Order amending the Food Rationing (General Provisions) Order, 1951.
2214	,,	30. Order amending the Fats, Cheese, and Tea (Rationing) Order, 1951.
		WELFARE FOODS
1195	July	6. Order amending the Welfare Foods Order, 1947.

The Vitamins

F. A. Robinson, M.Sc.Tech., LL.B., F.R.I.C.

PART I

Progress in 1951

There have been no spectacular discoveries in the vitamin field during 1951 and technically the outstanding events of the year are the increased production of synthetic vitamin A and of vitamin B_{12} made by fermentation. Most of the published work, however, relates to the more theoretical aspects of the subject and considerable progress has been made in elucidating the structures of codecarboxylase and coenzyme A of which pyridoxine and pantothenic acid respectively are the prosthetic groups. The chemistry of vitamin B_{12} is being explored, although the nature of much of the molecule is still unknown, while attempts are being made to synthesise the citrovorum factor or, as it is sometimes called, folinic acid, which appears to be a more active haematological agent than folic acid. Antagonists of folic acid continue to attract attention by virtue of their potential chemotherapeutic activity.

ALTHOUGH synthetic vitamin A is not yet made commercially in Britain, four companies are in production in the U.S.A., where it appears to compete on more or less equal terms with high potency concentrates made from fish liver oils.

A description of the process used by Chas. Pfizer and Co. has been published.[1] This company makes both the acetate and palmitate in the form of yellow crystalline powders, the former melting at 57°-58° C. and having a potency of $2{\cdot}9 \times 10^6$ i.u. per g. and the latter melting at 28°-29° C. and having a potency of $1{\cdot}8 \times 10^6$ i.u. per g. A stabilised form of crystalline vitamin A acetate is also made in which each particle is coated with a film of gelatine to protect it from oxidation.

A number of patent specifications[2] and papers[3] concerned with the synthesis of vitamin A and related compounds have been published.

The value of the vitamin A sold in the U.S.A. during 1949 was 12 million dollars—a sum far exceeding the value of any other single vitamin.

In spite of the steady increase in the amount of synthetic vitamin A now being manufactured, high potency concentrates of fish oils still form a very important source of the vitamin and, for most countries, the only source. Further patents have been published describing counter-current distribution methods for the extraction of vitamin A esters from fish liver oils, and a new method of extracting a rich vitamin A fraction from saponified oils.[4]

A substance has been obtained from lard by high vacuum distillation that exhibits vitamin A activity, but the nature of this substance is not yet known.[5]

Utilisation of Vitamin A

A number of investigations have been reported during the year on the efficiency with which carotene and various forms of vitamin A are utilised. It has been shown[6] that mineral oil and ethyl laurate contain factors that inhibit the hydrolysis of vitamin A esters *in vivo*, but the level at which vitamin A was given affected the utilisation of different forms of the vitamin; the natural ester was utilised more efficiently at low levels.

β-Carotene and vitamin A were utilised equally well when given along with α-tocopherol, but dispersal of vitamin A in Tween 40 diminished the efficacy of vitamin A while slightly increasing that of β-carotene.[7] Both vitamin A and carotene were more effective when given with lard. The addition of mineral oil, on the other hand, greatly reduced the utilisation of β-carotene but had less effect on vitamin A. Crystalline vitamin A acetate was much more efficiently utilised in the chick than was crystalline carotene.[8] Carotene is very well utilised in margarine.[9]

According to the basis of assessment used, neo-vitamin A has between 70 and 85 per cent. of the potency of all trans-vitamin A.[10] Earlier results indicating that vitamin A is more efficiently utilised when fed in aqueous dispersion than in oily solution have been confirmed.[11] Carotene is converted into vitamin A in the intestine, three-quarters of it being present as the ester.[12]

Although the main form of the vitamin in fresh water fish is vitamin A_1, they can also utilise the normal form without deleterious effects, and this is not converted into vitamin A_2.[13] Krill taken from the stomach of the northern baleen whale contains preformed vitamin A and only traces of carotene.[14]

Intestinal Synthesis of Carotene

It is now well established that intestinal synthesis is an important source of several members of the vitamin B complex for certain animals, and there is now some evidence that carotene may be synthesised by intestinal bacteria in certain species of animals. It was found for instance, that in the sheep the ratio of carotene to lignin decreased in the upper portion of the small intestine, increased in the ileum, reaching a maximum in the caecum, and decreased again in the colon.[15] The suggestion that carotene was synthesised in the ileum and caecum was supported by the observation that carotene was

synthesised on agar plates inoculated with micro-organisms from the caecum. The amount of vitamin A in the liver and the level of carotenoids in the blood serum of chicks were increased when penicillin was added to the diet.[16]

A case of hypervitaminosis A in an adult, due to self-medication with vitamin A preparations, has been reported.[17] The symptoms included loss of hair, pigmentation of the face, a scaling dermatosis, and acneform lesions.

Vitamin A_2

In last year's report reference was made to a publication which threw doubt on the accepted formula for vitamin A_2. A substance with the formula

has now been synthesised from vitamin A_1 acid and shown to behave similarly to natural vitamin A_2, so that the structure of the latter must still be regarded as an open question.[18] A homologue of β-carotene with 15 conjugated double bonds has now been synthesised by a method similar to that used for the synthesis of β-carotene itself.[19]

A little further light has been thrown on the function of vitamin A in the eye. It has been found that vitamin A is dehydrogenated to vitamin A aldehyde (retinene) by dehydrogenase and coenzyme I. This reaction is probably involved in the utilisation of vitamin A for the regeneration of visual purple.[20]

The stability of vitamin A acetate in solutions of Tween 40 or cottonseed oil is increased by the presence of tocopherol or nordihydroguaiaretic acid, the former being slightly more effective than the latter.[21] Dry vitamin A concentrates lost some of their activity in the initial stages of storage but retained at least 50 per cent. after six months.[22]

Vitamin A Assays

The spectrophotometric assay of vitamin A has been the subject of important collaborative tests during the year.[23] It has been found that the limits of error on a single sample assayed in duplicate in any one laboratory are about $\pm$ 15 per cent. ($P=0{\cdot}05$). The loss of accuracy in vitamin A assays may be owing to differences between the absorption curve of natural forms of vitamin A and that of pure all trans-vitamin A.

The properties of all trans-vitamin A and its acetate have been studied in five different laboratories; the results indicated that different solvents gave significantly different values for the molecular extinction coefficient. The factors required to convert values of $E^{1\%}_{1\,cm}$ into i.u. per g. were 1825 for vitamin A alcohol in ethanol, isopropanol, or light petroleum and for vitamin A acetate in light petroleum; 1850 for vitamin A acetate in ethanol; and 1906 for vitamin A alcohol and acetate in cyclohexane and for vitamin A acetate in isopropanol. For vitamin A alcohol, the factor of 1900 now generally used would be correct if cyclohexane were used as solvent and about 4 per cent. too high with isopropanol as solvent.

A New Pro-vitamin D and Vitamin K

Little or no work on the nutritional importance of vitamin D_2 appears to have been carried out during the year. Two patents and one publication describing new methods for the preparation of 7-dehydrocholesterol have appeared.[24] A new pro-vitamin A, the structure of which is not yet known, but which contains 29 carbon atoms, has been isolated from the mussel *Modiolus demissus*.[25] A mercaptan corresponding to 7-dehydrocholesterol has been prepared, but on irradiation it gave a product devoid of vitamin D_2 activity.[26] Phosphorylation of vitamin D_2 gave a substance with vitamin D activity.[27]

A substance that produced rickets in lambs was detected in green oats and other plants.[28] The development of rickets was not prevented by calcium or phosphorus or by weekly doses of cod liver oil, but massive doses of calciferol corrected the deficiency. A chloroform extract of the dried oats was rachitogenic.

Very few publications relating to vitamin K have appeared during the year. Water-soluble vitamin K preparations are effective in hypoprothrombinemia induced by the administration of dicoumarol.[29] Vitamin K appears to have no effect in preventing haemorrhagic disease of the newborn when given to mothers before delivery.[30]

Vitamin C

Further investigations have been made into the loss of ascorbic acid resulting from different methods of cooking green vegetables.[31] Pressure cooking brought about a somewhat greater loss of the vitamin than did ordinary cooking. Ascorbic acid oxidase is reported to be a copper-containing protein, blue-green in colour, with a molecular weight of 150,000 and containing 6 copper atoms per molecule.[32]

It has been found that pigs can synthesise vitamin C from birth.[33]

The excretion of vitamin C following repeated administration of big test doses to human volunteers was considerably greater during the first seven hours after administration of the test dose than during the rest of the 24 hour period.[34] Not more than about half the ascorbic acid administered was recovered in the urine when full saturation was reached.

In a series of studies with various kinds of diets, reduced ascorbic acid, dehydroascorbic acid, and diketogulonic acid were excreted on all dietary regimes. A larger intake of fruit and vegetables or supplementation of the diet with crystalline vitamin C resulted in an increased excretion of reduced ascorbic acid, but had little effect on the excretion of the other two metabolites.[35]

A new method of estimating ascorbic acid based on the formation of a red colour with dihydroxyperinaphthindone has been described.[36]

Aneurin in Enriched Rice

An interesting and important paper on the effect of enriching white rice with synthetic vitamin B_1 has been published.[37] The

rice was fortified with 2 mg. of vitamin B_1, 16 mg. of nicotinic acid, and 13 mg. of iron per lb. Large groups of the population in the Philippines were fed with the enriched rice and the incidence of beriberi was compared with that in similar groups subsisting on ordinary rice. In the first group the incidence of beriberi fell by 76 to 94 per cent., whereas in the adjacent control areas it increased slightly. Mortality from beriberi declined in the groups receiving the enriched rice from 263 to 28 per 100,000, while infantile beriberi mortality declined 53 per cent.

The symptoms of vitamin B_1 deficiency in lambs have been described.[38]

In the past attempts to measure the amount of aneurin in meat have given variable results according to the method used. It has now been reported that the biological assay of chopped ham gives a significantly higher value than the thiochrome method, because it also measures the response produced by another and as yet unidentified factor.[39] Fresh light has been thrown on the formation of thiochrome from aneurin and a different mechanism from that hitherto accepted has been proposed.[40]

As the result of a collaborative investigation, the Analytical Methods Committee of the Society of Public Analysts has recommended a modified fluorimetric method of estimating aneurin in cereals and cereal products, malt and malted products, yeast and yeast products, and meat and meat products.[41]

Biochemical Role of Aneurin

Although much is known about the biochemical role of aneurin, the precise reason why it can catalyse so many different transformations is not known. It has now been confirmed that cocarboxylase (aneurin pyrophosphate) will (*a*) decarboxylate pyruvic acid to acetoin and carbon dioxide; (*b*) reduce it to lactic acid; and (*c*) carboxylate it to oxaloacetic acid.[42] The amount of cocarboxylase in brain, muscle, and liver increases as the dietary concentration of aneurin is increased up to a maximum of 0·2 mg. per 100 g.; no further increase occurs beyond this point.[43] About 0·1 mg. per 100 g. of diet is required to support growth. Contrary to earlier reports, it has now been found that ingestion of alcohol does not call for an increased intake of aneurin.[44]

Use of Analogues of Aneurin

Considerable interest continues to be shown in the use of analogues of aneurin as antagonists to its growth-stimulating properties. Both pyrithiamine and neo-pyrithiamine exhibited a lag phase before producing vitamin B_1 deficiency in animals.[45] The latter was about four times as active as the former, the activity of which was shown to be entirely owing to the presence of neo-pyrithiamine.

Neo-pyrithiamine is actually a more potent aneurin antagonist than oxythiamine, while "chloro-oxythiamine" and "bromo-oxythiamine," in which the hydroxyl group has been replaced by a halogen atom, show no anti-vitamin activity, neither are they toxic to mice.[46] An improved method of preparing oxythiamine has been described.[47] Its triphosphate, unlike the free compound, strongly inhibited the carboxylase system,[48] as did neo-pyrithiamine pyrophosphate, which prevented the union of coenzyme with apoenzyme; the antagonism was competitive and reversed by cocarboxylase.[49] A new antagonist of aneurin—"homothiamine glycol"—has been described.[50]

Production of Riboflavin

Papers and patents relating to the microbiological production of riboflavin continue to be published[51] and it has been reported that up to 850 mg. per litre of riboflavin can be produced by fermentation with *Ashbya gossypii*. The yields are affected by the composition of the medium and the method of sterilisation, by the rate of aeration and agitation, temperature, and strain variety, and the effects of all these different factors have been investigated. The use of various nitrogenous by-products for adding to *A. gossypii* fermentations has been reported; the liquors were also good sources of vitamin B_{12} and the *Lactobacillus bulgaricus* factor (*see below*).

A titrimetric assay method with *L. helveticus* that can be completed in 17 hours is claimed to give results similar to those obtained by the conventional 72 hour test.[52] New colour reactions with Deniges' reagent and with silver nitrate have been described and these can be used for estimating riboflavin in pharmaceutical preparations.[53] The former gives an orange-red colour and the latter a brick red colour. From time to time new methods of solubilising riboflavin are proposed; the lower aliphatic hydroxy amides of gentisic acid have now been suggested for this purpose.[54]

It has frequently been reported that compounds related to riboflavin may cause regression of tumours in animals, and it has recently been claimed that 6:7-dichloro-9(1′D-sorbityl)-isoalloxazine causes regression of established lymphosarcoma implants in mice, although a number of closely related compounds were quite inactive.[55]

Lyxoflavin increases the growth rate of rats, but cannot replace riboflavin in the diet of the rat.[56] It therefore appears to be a new vitamin and not merely an analogue capable of replacing riboflavin.

Nicotinic Acid

Most of the recently published papers relating to nicotinic acid have been concerned with unravelling the connexion between tryptophan and nicotinic acid. It was proved some time ago that tryptophan can in some degree replace nicotinic acid, but the way in which this occurs is still only partially known. It has now been demonstrated that tryptophan is first converted into formyl kynurenine, which is then broken down by a specific enzyme into kynurenine.[57] It has also been demonstrated that both 3-hydroxy- and 3:4-dihydroxy-anthanilic acid can be converted into nicotinic acid probably by way of quinolinic acid,[58] but it is still

not known how the intermediate stages of the synthesis occur. Evidence for these transformations is derived from research on both animals and micro-organisms. It is interesting to note that in pyridoxine-deficient rats the urine is particularly rich in metabolites of tryptophan,[59] confirming the view referred to below, that pyridoxine plays a part in the biosynthesis of nicotinic acid in the rat.

Normally only L-tryptophan is utilised by the chick but with a starch diet the D-isomer may also apparently be utilised, probably as a result of changes in the bacterial flora; feeding sulphasuxidine reduces the value of D-tryptophan.[60] Intestinal synthesis also appears to be of importance in the rat and the form of nicotinic acid synthesised depends on the diet and on the nature of the nicotinic acid precursor.[61] The amount of nicotinic acid synthesised in the intestinal tract, however, cannot be correlated directly with the growth response.

There is some evidence to suggest that in the rat the synthesis of pyridine nucleotides depends more on the dietary tryptophan than on the dietary nicotinic acid, implying that nicotinic acid as such is not a necessary intermediate in the synthesis of nucleotides.[62]

Methods of Estimation

As is well known, nicotinic acid can be excreted in a number of different forms, and attempts to study the metabolism of nicotinic acid have sometimes been frustrated by the difficulty of distinguishing between these different forms. It has been reported that these are readily separated from one another by paper chromatography,[63] while radioactive nicotinic acid and nicotinamide have also been used in metabolism studies and the metabolites separated on paper strips and identified.[64]

New methods suggested for the estimation of nicotinic acid include a stable isotope dilution method,[65] and a fluorimetric method involving the use of synthetic ion-exchange resins.[66] A method of determining nicotinic acid in the presence of nicotinamide has been suggested; in this the two compounds are first separated by paper chromatography and then separately assayed,[67] while in another method advantage is taken of the fact that the light absorption at 430 mμ of the colour formed by reacting nicotinic acid with cyanogen bromide and an amine is approximately twice that of the colour produced with nicotinamide.[68] It has been claimed that ammonia can be used in place of amines in this colour reaction with satisfactory results.[69]

Enzymatic extraction gives higher values than does acid extraction for pulses, but lower results for oil seeds and cereals.[70] Considerable variations in the nicotinic acid content of cereals grown under different environmental conditions are reported.[71] Corn (maize) contained 19·5 to 25·8; wheat 46·0 to 50·4; oats 12·3 to 15·8; and soya beans 22·8 to 26·6 μg. per g. A combined form of nicotinic acid exhibiting no biological activity in the rat has been shown to be present in maize, wheat, rice, and barley bran.[72]

REFERENCES

1 *Manufacturing Chemist*, 1951, 435.
2 N. V. Organon, B.P. 646586, 650887; Roche Products Ltd., B.P. 646623; Ortho Pharmaceutical Corp., B.P. 653679; Research Corp., B.P. 649339, 656462; Glaxo Labs., B.P. 659842; W. R. Warner and Co., B.P. 660368.
3 P. Karrer and K. P. Karanth, *Helv. Chim. Acta*, 1950, **33**, 2202; N. L. Wendler *et al.*, *J. Amer. Chem. Soc.*, 1951, **73**, 719; B. C. L. Weedon and R. J. Woods, *J. Chem. Soc.*, 1951, 2687.
4 M. W. Kellogg Co., B.P. 648268; Nopco Chemical Co., B.P. 648469; Pittsburg Plate Glass Co., B.P. 658411.
5 H. Kaunitz and C. A. Slanetz, *J. Nutr.*, 1950, **42**, 375.
6 E. F. Week and F. J. Sevigne, *J. Nutr.*, 1950, **42**, 525.
7 M. J. Burns *et al.*, *Arch. Biochem.*, 1951, **30**, 341, 347.
8 F. F. Castano *et al.*, *J. Nutr.*, 1951, **45**, 131.
9 H. J. Deuel *et al.*, *J. Nutr.*, 1951, **43**, 371.
10 P. L. Harris *et al.*, *J. Amer. Chem. Soc.*, 1951, **73**, 1252.
11 A. E. Sobel and A. A. Rosenberg, *J. Nutr.*, 1950, **42**, 557.
12 S. Y. Thompson *et al.*, *Brit. J. Nutr.*, 1950, **4**, 398.
13 S. R. Morcos and M. K. Salah, *Nature*, 1951, **167**, 117.
14 E. Batham *et al.*, *Biochem J.*, 1951, **48**, *Proc.*, x.
15 W. A. McGillivray, *Brit. J. Nutr.*, 1951, **5**, 223.
16 R. C. Burgess *et al.*, *Arch. Biochem.*, 1951, **33**, 339.
17 M. B. Sulzberger and M. P. Lazar, *J. Amer. Med. Assoc.*, 1951, **146**, 788.
18 K. R. Farrer *et al.*, *Chem. and Ind.*, 1951, 49.
19 P. Karrer and C. H. Eugster, *Helv. Chim. Acta*, 1951, **34**, 28.
20 A. B. Bliss, *Arch. Biochem.*, 1951, **31**, 197.
21 J. G. Bieri, *J. Nutr.*, 1951, **44**, 327.
22 M. J. Burns and F. W. Quackenbush, *Ind. Eng. Chem.*, 1951, **43**, 1592.
23 D. C. M. Adamson *et al.*, *Analyst*, 1951, **76**, 445; N. T. Gridgeman, *ibid.*, 449; J. Boldingh *et al.*, *Nature*, 1951, **168**, 598.
24 Peboc Ltd., B.P. 656115; Lovens Kem. Fab., B.P. 656388; W. G. Dauben *et al.*, *J. Amer. Chem. Soc.*, 1951, **73**, 4496.
25 H. R. Rosenberg and J. Waddell, *J. Biol. Chem.*, 1951, **191**, 757; H. G. Petering and J. Waddell, *ibid.*, 765.
26 S. Bernstein and K. J. Sax, *J. Org. Chem.*, 1951, **16**, 685.
27 R. Zetterström, *Nature*, 1951, **167**, 409.
28 A. B. Grant, *Nature*, 1951, **168**, 789.
29 R. S. Overman *et al.*, *J. Amer. Med. Assoc.*, 1951, **145**, 393.
30 J. D. Hay *et al.*, *Lancet*, 1951, **1**, 423.
31 M. A. Allen and S. G. Burgess, *Brit. J. Nutr.*, 1950, **4**, 95; A. R. P. Walker and U. B. Arvidsson, *Brit. J. Nutr.*, 1951, **5**, 167.
32 F. J. Dunn and C. R. Dawson, *J. Biol. Chem.*, 1951, **189**, 485.
33 R. Braude *et al.*, *Brit. J. Nutr.*, 1950, **4**, 186.
34 J. Sigurjonsson, *Brit. J. Nutr.*, 1951, **5**, 216.
35 S. D. Chen and C. Schuck, *J. Nutr.*, 1951, **45**, 165.
36 M. S. El Ridi *et al.*, *Science*, 1950, **112**, 751.
37 J. Salcedo *et al.*, *J. Nutr.*, 1950, **42**, 501.
38 H. H. Draper and B. C. Johnson, *J. Nutr.*, 1951, **43**, 413.
39 O. B. Fardig *et al.*, *J. Nutr.*, 1951, **44**, 29.
40 P. Sykes and A. R. Todd, *J. Chem. Soc.*, 1951, 534.
41 *Analyst*, 1951, **76**, 127.
42 M. Gruber and F. G. D. Meyer, *Biochim. Biophys. Acta*, 1951, **6**, 445.
43 R. U. Byerrum and J. H. Flokstra, *J. Nutr.*, 1951, **43**, 17.
44 A. W. Wertz *et al.*, *J. Nutr.*, 1951, **43**, 181.
45 D. W. Woolley, *J. Amer. Chem. Soc.*, 1950, **72**, 5763.
46 L. R. Cerecedo *et al.*, *J. Biol. Chem.*, 1951, **189**, 293; *J. Amer. Chem. Soc.*, 1950, **72**, 5749.
47 H. N. Rydon, *Biochem. J.*, 1951, **48**, 383.
48 L. Velluz and M. Herbain, *J. Biol. Chem.*, 1951, **190**, 241.
49 D. W. Woolley, *J. Biol. Chem.*, 1951, **191**, 43.
50 P. Karrer and M. Schoeller, *Helv. Chim. Acta*, 1951, **34**, 826.
51 V. F. Pfeifer *et al.*, *Ind. Eng. Chem.*, 1950, **42**, 1776; K. L. Smiley *et al.*, *Ind. Eng. Chem.*, 1951, **43**, 1381; Roche Products Ltd., B.P. 651671.
52 A. Jones and S. Morris, *Analyst*, 1950, **75**, 608.
53 M. Z. Barakat and N. Badran, *J. Pharm. Pharmacol.*, 1951, **3**, 501.

[64] Roche Products Ltd., B.P. 651113.
[65] F. W. Holly *et al.*, *J. Amer. Chem. Soc.*, 1950, **72**, 5416; 1951, **73**, 332.
[66] G. A. Emerson and K. Folkers, *J. Amer. Chem. Soc.*, 1950, **73**, 2398.
[67] W. E. Knox and A. H. Mehler, *J. Biol. Chem.*, 1950, **187**, 419, 431.
[68] K. Makino *et al.*, *Nature*, 1951, **167**, 115; A. H. Bokman and B. S. Schweigert, *Arch. Biochem.*, 1951, **33**, 270; C. Yanofsky and D. M. Bonner, *J. Biol. Chem.*, 1951, **190**, 211; D. Davis *et al.*, *J. Biol. Chem.*, 1951, **189**, 543.
[69] C. E. Dalgleish *et al.*, *Nature*, 1951, **168**, 26.
[70] J. O. Anderson *et al.*, *J. Nutr.*, 1950, **42**, 463.
[71] L. V. Hankes *et al.*, *J. Biol. Chem.*, 1950, **187**, 547.
[72] J. N. Williams *et al.*, *J. Biol. Chem.*, 1950, **187**, 597; 1951, **189**, 659; *Proc. Soc. Exp. Biol. Med.*, 1951, **76**, 441.
[73] C. F. Huebner, *Nature*, 1951, **167**, 119; E. Kodicek and K. K. Reddi, *Nature*, 1951, **168**, 475.
[74] E. Leifer *et al.*, *J. Biol. Chem.*, 1951, **190**, 595.
[75] N. R. Trenner *et al.*, *Anal. Chem.*, 1951, **23**, 487.
[76] M. Kato and H. Shimizu, *Science*, 1951, **114**, 12.
[77] E. G. Wollish *et al.*, *Anal Chem.*, 1951, **23**, 768.
[78] J. P. Sweeney and W. L. Hall, *Anal. Chem.*, 1951, **23**, 983.
[79] A. Mueller and S. H. Fox., *J. Amer. Pharm. Assoc., Sci. Ed.*, 1951, **40**, 513.
[80] K. Sohonie and U. C. Misra, *Brit. J. Nutr.*, 1950, **4**, 134.
[81] J. C. Carroll and C.-L. Peng, *Science*, 1951, **113**, 211.
[82] E. Kodicek, *Biochem J.*, 1951, **48**, *Proc.*, viii.

(*To be continued*)

Our Contemporaries

Articles published in the associated journals of the Leonard Hill Group this month include the following:

"Roselle—A Second Jute Substitute," by A. E. Haarer, F.L.S., and an account of the Rome Conference of FAO (*World Crops*).

The design and construction of the Claerwen Dam in Wales for the Birmingham Water Authorities (*Muck Shifter*).

The third in the series of articles on roofing by J. Stroud Foster, A.R.I.B.A. (*Building Digest*).

A description of the new British Ceramic Research Laboratories at Stoke-on-Trent (*Pottery and Glass*).

The manufacture of dextran, "D.C.M.X. A Potent New Disinfectant," by John Gemmell, B.Sc., and progress reports on economic poisons and perfumery and essential oils (*Manufacturing Chemist*).

World Congress of Chemistry

MANY research achievements were reported by chemists from a number of countries at the 12th International Congress of Pure and Applied Chemistry which met in New York last September.

Large scale synthesis of riboflavin, or vitamin B_2, in the form in which the body utilises it was announced by Dr. Leo A. Flexser and Walter G. Farkas of Hoffmann La Roche Inc., Nutley, N.J. The compound involved is riboflavin-5′-phosphate, and the new synthetic process makes it available in large quantities. The increased solubility of the vitamin in this form greatly enhances its value for pharmaceutical purposes.

Riboflavin, essential to growth, occurs naturally in such foods as eggs, liver, milk, and green leafy vegetables. When taken into the body in its natural form, it is promptly subjected to phosphorylation before the body starts to use it. The vitamin itself is rather insoluble and phosphorylation makes it more soluble without interfering with its biological activity.

Thus Flexser and Farkas have made available for nutritional and therapeutic use a form of the vitamin which is one step closer than natural riboflavin to the material actually employed by the body. Owing to its greater solubility, riboflavin-5′-phosphate can be used, for example, to provide a full physiological dose in vitamin drops for babies.

The synthetic compound also will be of great interest in biochemical and medical research, since the soluble material can be injected directly into the bloodstream, in much larger amounts than has been possible heretofore, thus greatly facilitating the study of its effects.

Improved Toxicity Test Methods

Improved and faster methods of testing new chemicals, prior to human use, were described by L. C. Cartwright, A. H. Gee, and I. L. Seidenberg, of Foster D. Snell, Inc., New York. They asserted that their methods save time and expense, spare laboratory animals, and also make for more accurate results in trying out the effects of new chemical compounds which may come in contact with food, or be used in new drugs or cosmetics.

In addition to revealing possible toxic effects in trials with animals, they claimed that the shortened procedures can also be used to minimise work in testing new antiseptics. Furthermore, if necessary, plants could be quickly tested for edibility.

Savings possible with the new toxicity testing procedure are considerable when it is necessary to screen or try out dozens or hundreds of new compounds in the search for one for human use with advantages over existing materials. The work may require ordinarily thousands of animals on test, or the preparation of a similar number of cultures of bacteria.

Use of Logarithmic Scales

In developing their method, the investigators set themselves the objective of establishing the shortest path from no knowledge about a new compound to fixing the limits of one or more of its biological properties. They use a pattern of increasing dosages based on a logarithmic table rather than on an arithmetic table. The difference is the same as the difference between a table of compound interest and a table of simple interest. This has been attempted in the past, although not on a fully systematised basis.

In the Foster D. Snell laboratories, all the work with a new compound is done with logarithmically related dosages, from the first orientation work to refined tests in which the precise effective —or toxic—concentration of a new compound is arrived at. Procedures hitherto accepted frequently required the use of many groups of ten animals each in the later stages of an investigation of a new compound. By using logarithmic scales throughout, the refined data may often be obtained with a single group of ten animals, using a sliding scale of doses instead of a uniform dose.

In addition, the sliding scale or logarithmically graded doses give

a more reliable result than the fixed dose. The latter may even give a misleading result. This is especially true in seeking data on new compounds tending to give variable results.

The method applies to a variety of materials the consulting chemist is asked to evaluate.

One test described where the sliding dosage scale proved useful was in trying out chemical intermediates. With logarithmic screening it is possible to find out promptly whether such compounds are a hazard to people handling them in chemical factories. Examples cited included intermediates used to synthesise some of the newer insecticides.

In using their logarithmic procedure, the Snell workers cut their "paper" work to a minimum with two simple devices. Frequently much time is required to estimate doses for test procedures in either biology or bacteriology. The Snell system is based on one continuous and standard table of dose figures, printed up and coded for screening or final experiments.

Along with the table goes special chemical glassware for dosage measurement, made in conical shapes with the dosage scales engraved directly on them. This cuts down on the number of pieces of glassware needed for a test and also minimises the possibility of mistakes.

Hastening Plant Growth

Workers at the University of California have discovered a group of chemicals related to a drug now under investigation as an anti-tuberculosis agent, which have properties similar to those of 2,4-D, the powerful weed-killer. Drs. P. P. T. Sah, R. Pratt, and J. Dufrenoy, of the University's College of Pharmacy at San Francisco, explained how these new chemicals, derivatives of thiosemicarbazone, induce early flowering and hinted that they may be used in horticulture in the same way as 2,4-D.

Using dormant twigs of grapevines they demonstrated in their laboratory what they called the "relatively rare property of flower-inducing" and "the remarkable ability to suppress the normal dominance of the uppermost bud and thus allow the lower buds to develop almost as fast as the uppermost." This last property may be a means of increasing fruit output of a plant.

On cuttings treated with some derivatives of thiosemicarbazones, notably those embodying the benzaldehyde structure, the clusters of flowers develop much sooner than on the "controls" and may even develop before any leaves appear on the vines.

New Phosphorus Insecticide

A new insecticide with a wide range action, little risk of contamination at harvest time, and little danger of soil poisoning was reported by Dr. S. S. Sharp of the du Pont Co., Wilmington.

The insecticide, ethyl *p*-nitrophenylthionobenzenephosphonate, better known as EPN, was synthesised first in a du Pont laboratory late in 1947. It was introduced to fruit growers, principally in the Pacific north-west, in the spring of 1950 to control mites.

As a result of extensive tests during the past year, EPN is now known to control a wide variety of crop-destroying insects. Fruit growers are using it to control plum circulio, Oriental fruit moth, and other orchard pests. In the mid-west, tests have shown EPN to be effective in European corn borer control.

In its pure form, EPN is a pale-yellow crystalline substance. For commercial use, it is formulated in a 25 per cent. wettable powder known as EPN-300 insecticide, which rapidly forms a suspension in water. Its insecticidal action stems from its inhibition of the enzyme cholinesterase, which regulates the muscular reactions dictated by nerve impulses.

Residues of EPN on both fruit and foliage of sprayed trees are rapidly dissipated following the initial period of insecticidal activity. This allows the grower to make applications with sufficient frequency and concentration of the chemical to protect the crop, without risk of harmful chemical residues at harvest time.

EPN is an organic phosphorus compound, and must be handled with care. Protective clothing should be worn and contact with or inhalation of sprays containing EPN must be avoided.

Humidity in Cold Stores

A SYMPOSIUM comprising six papers on the control and measurement of humidity in cold stores was delivered before the Institute of Refrigeration on December 13.

The first of these, by R. Hendry of the Royal Technical College, Glasgow, dealt with the control of moisture content of air under three sub-headings: the properties of air and water vapour mixtures; mass transfer between water and air; and the behaviour of materials in cold storage. In this latter section, he outlined the deterioration that was likely to occur in stored materials unless proper humidity conditions were maintained in cold storage. Meat, for example, would shrink if the humidity was too low and became slimy if too high. Abnormalities in humidity conditions would lead to the drying out of dairy products, fruit, and vegetables.

Systems by which such abnormalities could be overcome were described by Mr. Hendry.

The attempts that have been made to produce a single instrument for the measurement of humidity for use at temperatures below the freezing point of water were the subject of a paper on hygrometry in cold stores by Ezer Griffiths, O.B.E., D.Sc., Hon. M.Inst.R., F.R.S. He reviewed the limitations of the wet and dry bulb hygrometer, the dew point apparatus, and the hair hygrometer and briefly described the developments in electrical resistance hygrometers, the fog formation hygrometer, and others

Egg Storage

A review on humidity control in egg storage was presented by J. Brooks, B.Sc., Ph.D., of the Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge and De-

partment of Scientific and Industrial Research.

The successful storage of eggs required a strict control of temperature and humidity. Considerable importance was attached commercially to the depth of the air-cell of the egg (the depth increased as evaporation proceeded) and the aim of humidity control during storage was to reduce evaporation to a minimum while still retaining an adequate margin of safety against spoilage by moulds.

After dealing with the evaporation of water from eggs, Dr. Brooks outlined the temperature requirements for their storage and the systems of cooling used. He also mentioned the advantages of dipping eggs for a few seconds in a mineral oil before placing them into cold store and, in some countries, before export.

Storage at Sea

The cold storage of chilled beef, cheese, and apples in refrigerated spaces on board ship and methods of controlling relative humidity in such spaces were the subject of a paper by J. R. Stott, B.A., B.Sc. In this paper the influence exerted on humidity conditions by packaging materials was commented upon. Such an influence could sometimes be turned to advantage by choosing a packing material that would deliberately control the humidity to which the actual produce was subjected. To illustrate this point, Mr. Stott instanced the shipping of lambs' livers in metal pails.

Cold Stores

Mr. G. Mann, of the Ditton Laboratory, Department of Scientific and Industrial Research, showed in his paper on the temperature and humidity in cold stores and the loss of water from stored produce, how loss of weight from produce in a store was influenced by such factors as the surface area and temperature of the cooler coil, the rate of air circulation, heat leakage into the store, and, with fruit and vegetables, their rate of heat production.

The final paper, on the drying of fish in cold store, was presented

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by A. Banks, B.Sc., Ph.D., F.R.I.C., of the Torry Research Station, Department of Scientific and Industrial Research, who stressed the economic aspect of losses in weight which resulted from the drying of fish in cold stores.

Drying during cold storage might also seriously affect the quality of frozen fish. "Glazing," which would prevent injury to fish through drying, preserved the quality of all kinds of frozen fish during cold storage.

It was suggested that drying might be reduced by modifying the accepted design of cold stores. The actual prevention of heat penetrating into storage chambers should be the maxim, and Dr. Banks gave some details of the way in which such modifications could be made.

Packet Foods in America

THE report* of the packet foods industry productivity team which visited America during March and April, 1951, to study the manufacturing and packaging methods of such products as cake and pudding mixtures, cereal breakfast foods, macaroni, powdered soups, self-raising flour, starch food powders, and table jellies, has recently been published.

The wide field covered by the team is evidenced by the various sections of the report which include a survey of the American food industry, management control and office management, supplies, production methods and factory buildings, scientific control and research, industrial relations, sales and distribution, warehousing and transport, individual products, and productivity.

It will be readily understood that American food manufacturers have a great initial advantage over those in Britain in that they have an immediate call on all the raw materials they may require, all of a very high standard of quality. In addition to this is the ready availability of a great range of packaging materials and the development of high speed packing and other machinery.

A word of praise is accorded to the British scientist concerned with fundamental investigations into the properties of foodstuffs, in that he is often ahead of his American contemporary, although the latter excels in applied science. In this connexion the team recommend the provision of a pilot plant, however small, to assist in the transference of methods and processes worked out in the laboratory to factory scale production.

That section of the report dealing with individual products will be of particular interest to the British food manufacturer; in this descriptions of the processing operations and of the many different types of machinery employed for each particular item have been dealt with in a comprehensive manner.

Although allowances are made for the serious handicaps that have been imposed upon the British manufacturer by reason of scarcity of new machines and packaging materials, inadequate supplies of fuel and power, difficulties in obtaining building licences, and the rigid system of allocation of raw materials, the team found that many of the improvements made during the past ten years in the United States could be adapted for use in the British food manufacturing industry which would result in increased productivity and efficiency.

Among the recommendations made are: the introduction of as high a degree of mechanisation as possible, particularly in the field of continuity of operation, bulk storage, and conveying methods; the design and production of new machines in close collaboration with the food manufacturer; the practical application of knowledge gained through research on the factory floor; and the development of a more attractive and individual pack in view of the possible future of self-service stores.

* *Packet Foods.* Productivity Team Report. Pp. 71 + xii. Anglo-American Council on Productivity, London and New York. Price 4s. 6d.

The Confectionery Industry

Progress in 1951

R. L. Kenny, B.Sc., F.R.I.C.

In the early part of the year there was every indication that the industry was making rapid strides towards freedom from control. This was apparent both in the facilities offered for the acquisition of raw materials and in the methods of packaging. Unfortunately, in common with other food industries, it would now appear that the restrictions imposed towards the latter end of the year are likely to stifle expansion and progress for some considerable time. Perhaps the industry may consider itself a little more unfortunate than others in that it still manufactures a rationed commodity, since controls are easier to reimpose than on other industries where freedom at the point of retail sale has been introduced. A healthy competitive spirit, however, now prevails, and if the raw material position were to improve, there would be every reason to suppose that manufacturers would be quick to introduce greater variety into their products.

DURING the greater part of the year, importation of Continental processed raw materials has been permitted on open general licence, thus allowing manufacturers to supplement their allocations and maintain a ration of 6½ oz. per week. A premium was, however, being paid for such imports as were ultimately destined to be converted into finished products retailing at a controlled price, and, therefore, the proportion which could be utilised was not unlimited.

When efforts were made to obtain consumer price concessions, it was argued that as production would drop appreciably if these materials were not imported, then overheads on reduced output would increase, and therefore this did not represent an additional financial burden. This was considered by the confectioners to be very debatable, and the whole scheme appeared to be somewhat Gilbertian in its conception, in so far as European countries were purchasing sugar which they were permitting their own factories to turn into partly processed goods so that these could be sold to Britain at premium prices.

Reprocessing Imported Materials

The British confectionery industry was essentially concerned with obtaining fats and sugar. Consequently, in some cases a certain amount of reprocessing had to be carried out in this country in an attempt to nullify the original mixing. For example, many mixtures of fat and sugar had to be separated so that each raw material could be utilised independently, because the particular recipes involved did not call for the proportions present in the imported article.

Influx of Foreign Confectionery

This in itself was a situation which appeared to be farcical, but further irritation was caused by the issue of licences for the importation of Chocolate Assortments from Central European countries such as Czechoslovakia which could be retailed free of price control in expensive packaging provided that they were sold against the surrender of points, and that the country of origin was clearly indicated.

Manufacturers, faced with both price and packaging control, received this influx of foreign confectionery most unfavourably. The Board of Trade appeared to take the view that the overall proportion was small, and that such importation was rendered necessary by mutual trade agreements.

The policy of having to import types of goods which are not acceptable against highly desirable exports from Britain appears on the surface to be a trade agreement based upon the theory of export at any cost with unilateral advantages.

At the same time a cut in the allocation of sugar from 62½ per cent. to 54 per cent. of the basic usage as from November 16 has created still further embarrassment, and made the industry more than ever dependent upon the supply of imported raw materials.

Restriction of Imports

Towards the end of the year, however, the Government drastically curtailed the amount of processed raw material which it proposed to permit the industry to import during the first six months of 1952 from countries outside the sterling area. In future, importation from these sources will be by means of specific licences which will bear a direct relationship to the value imported during the first half of 1951.

Manufacturers in submitting application for a licence will have to stipulate the value of previous imports, and only those made direct with the country concerned will be taken into account. Quotas have been fixed for each type of raw material representing a proportion of the previous year's imports expressed as a monetary value. If, therefore, the price of such processed materials should increase during the coming year, then the volume is likely to be correspondingly smaller.

Open general licences still exist, however, for the importation of materials from countries still operating in the sterling area, which has made it possible to maintain freedom of purchase for both cocoa beans and cocoa butter. Perhaps Ireland and South Africa may prove to be important sources of supply of materials, and it is hoped that such countries may be able to bridge the gap.

Cocoa and Cocoa Butter

Since the responsibility for purchasing cocoa and cocoa butter was re-invested in the industry,

little difficulty has been experienced in obtaining these basic commodities, although the higher quality beans from the South American countries have naturally been in short supply.

A purchasing panel representing the trade has been responsible for the purchase of approximately 75 per cent. of the total requirements, as an intermediate phase in a return to complete freedom.

It is now considered that this panel has served its purpose, and it is likely that manufacturers will prefer to purchase supplies of cocoa independently in the near future.

The fall in the world price of cocoa has continued, which is a very healthy sign indeed, because during the early part of the year the price had soared so high that there was a very definite danger that the public would tend to become less interested in chocolate, not because of any lack of appreciation, but because the selling price was assuming proportions beyond their limited spending power. As a result there was a very definite trend in favour of the purchase of sugar confectionery, the price of which had remained reasonably static.

This reduction in the price of cocoa has been made possible by the steady improvement in the crops since 1947 when the swollen shoot disease in West Africa had wrought its maximum devastation. During the last four years there has been a steady increase in the production of cocoa, which is now rapidly assuming pre-war dimensions.

Sugar the Limiting Factor

Sugar therefore remains the limiting factor in the production of chocolate and sugar confectionery, and it is for this reason that importation of sweetened ingredients from the Continent has been negotiated on such a wide basis.

Cocoa supplies have been derived mainly from the British Commonwealth, and the bulk has consisted of Accra, Trinidad, and Samoan varieties; this has naturally tended to give a somewhat less mellow resultant couverture than is desirable. The effect of this has been minimised by the rebalancing of couverture recipes, so that a higher proportion of sugar was often employed. This also had the effect of reducing the price of the couverture, since the cost of beans and cocoa butter although falling steadily throughout the year is still greatly in excess of the basic price for sugar. While, therefore, supplies of imported sugar, in the form of partly manufactured goods, were available from the Continent this practice has been of considerable assistance to manufacturers in maintaining a high output at reasonable prices.

The intake of block milk from Holland and the acquisition of milk crumb from Denmark have been instrumental in making available large quantities of milk chocolate. With the likelihood of Continental supplies being severely restricted in the future it would appear that much is going to depend upon the availability of supplies of milk crumb from Ireland, but in any case there is likely to be a restriction on the quantity of milk chocolate available.

Profits Cut

In an attempt to maintain controlled selling prices against steadily rising cost of raw materials, the Ministry has been forced not only to cut manufacturers' profits, but also to spread the burden so that it is shared by the retailer, in so far as discount margins have been appreciably reduced.

While admitting that pre-war margins up to 33⅓ per cent. were excessive for the risks involved, the pendulum would now appear to have swung so far the other way as to make retail trading a hazardous venture on a margin of anything from 15 per cent. to 22½ per cent., with steadily rising overheads, and the prospect of lowered sales through a reduction of the ration. There is a tendency under such conditions for many of the smaller one-man business type of shops to be submerged by larger retail organisations.

Developments in Packaging

Greater freedom has been allowed on the question of packaging, in so far as specific allowances are now permitted on the strict understanding that the basic price of the Chocolate Assortment remains the same, and that the additional charge for packaging be clearly indicated to the public by means of price tickets. This has resulted in the availability of more attractive boxes of chocolates which have been particularly acceptable for the Christmas trading, but with the curtailment of imported raw materials, and the distinct possibility of a reduction in the ration, it is doubtful if these will be so popular in the New Year.

New type of cellulose acetate packaging.

The board position has remained difficult throughout, not only on the question of supply, but also on account of the steadily rising prices which the industry has had to bear, and which have had to be passed on to the public in the form of second costs.

Manufacturers have, therefore, had to envisage alternative forms of packaging, and perhaps one of the most interesting to make a reappearance is the transparent cellulose acetate container as a packaging unit for marketing Chocolate and Candy Assortments.

Advantages of Acetate Containers

Acetate containers have the advantage of utilising a different type of raw material which is at present readily available, and the increased presentation afforded by the transparent properties of the container makes it an extremely acceptable unit for gift purposes. There is also the added advantage that while the orthodox Chocolate Assortment pack is based upon rectangular design, the easiest and cheapest method of manufacturing acetate containers is in cylindrical form, which gives added variety to a range.

Bases can be prepared either from cardboard discs or cellulose acetate, both alternatives having certain disadvantages. For example, an all-acetate base will not permit free passage of air when the lid is withdrawn, which makes the operation just that little bit more difficult owing to the creation of a partial vacuum assisted by a close-fitting lid. On the same principle, when the lid is being replaced, a resistance is created through the inability of air to escape.

Protection from Moisture

With the cardboard base, passage of air is permitted in either direction, but there is then the disadvantage of free access to moisture penetration, and the cylindrical nature of the pack renders its after protection somewhat more difficult. Against this, however, must be weighed the fact that on account of the shortage of moistureproof transparent wrapping material, all manufacturers have been prohibited from envelope wrapping Chocolate Assortments, with the result that the protection against moisture of standard box packs has been seriously reduced.

The only form of wrap now permitted is a narrow band strip of non-moistureproof film to provide an adequate form of closure to the box, contributing very little towards the ultimate protection of the contents.

If, therefore, the incidence of sugar bloom is to be avoided in the future, greater care will need to be exercised in turning over stocks on shelves of the retailers. Under such circumstances, the marketing of acetate containers is not necessarily introducing a type of packaging with a greatly reduced form of protection, but when conditions return to normal and manufacturers are allowed a freer choice, then steps may have to be taken to improve considerably the moisture resistance of this type of container.

Flavouring Problems

Perhaps one of the most disappointing aspects of progress has been the lack of natural flavouring materials which form a very important ingredient of confectionery. In certain instances these have disappeared altogether, but those which still remain have become so expensive as to preclude their introduction into standard lines. For example, almonds, coffee, and albumen have all now to be considered as very expensive additions indeed.

Similarly the price of pure fruit concentrates, such as raspberry and strawberry, naturally bear direct relationship to the price of fresh fruit, and render addition without fortification a very costly procedure.

Canned fruits which at one time made a very important contribution towards centre preparation for Chocolate Assortments in the form of pineapples, cherries, etc., are now no longer available.

Synthetic Flavourings

It has, therefore, been necessary for manufacturers to consider more and more the utilisation of synthetic flavouring material to offset deficiency of these natural products. Hence it is now more difficult to vary the character and texture of the centre, although variety of flavour can still be achieved.

There is a constant search for solvents which will take the place of dutiable alcohol. Diacetin and triacetin are coming more into prominence in this respect, particularly where dilution of essential oils is required in high boilings. The non-volatile properties of these solvents act as fixatives to the essential oils, thereby reducing the losses.

The main objective, however, at this stage is not so much to produce solvents which have the necessary properties for holding up the essential oils, but rather to prove beyond all doubt that they do not exhibit any toxic effects of a cumulative nature.

Essential oils have been the main standby for flavouring, but availability has been restricted. Those such as Limes oil which are mainly derived from the sterling area have been available in quantity, although at steadily rising prices.

Peppermint piperita has been somewhat difficult because of the lack of American sources of supply, but a considerable quantity of Italian rectified oil has been available which has proved a satisfactory alternative. Supplies of essential oil generally through the coming year are likely to be curtailed, but there is reason to suppose that the quota will be more generous than for other imported raw materials.

Rationing Prospects

Since the basic allocation of sugar has recently been cut and reduced quotas are now in operation for imported raw materials, it is almost inevitable that the ration will have to be reduced in the New Year. The extent to which this becomes necessary will be governed by the stocks which the manufacturers can make available. The derationing of sweets would still, therefore, appear as a distant mirage, since the Government are purchasing sugar from every possible soft currency source, without apparently bridg

(Concluded on page 64)

Food Controls in Great Britain

C. G. Daubney, M.Sc., F.R.I.C.

PART VI

In the sixth and final instalment of this series of articles, some notes on the analysis of various products, including welfare foods, are given. Also incorporated is an addendum giving the changes that have been made by Amending Orders since the commencement of this series.

WHEN dealing with chocolate and sugar confectionery the definition of sugar embraces all the normal commercial types of sugar, including those which reduce Fehling's solution.

Chocolate and Sugar Confectionery

The determination of cane sugar (sucrose) in toffees, seaside rock, coconut ice, and the like is carried out by Fehling's titration before and after inversion, while the approximate proportions of the various reducing sugars can be calculated by a combination of titrimetric and polarimetric readings as described by Rheinlander (*Analyst*, 1950, **75**, 444).

Care must be taken to avoid changes in weight due to the hygroscopic nature of liquid glucose —a frequent ingredient of such products—and to guard against inversion of sucrose owing to added citric or other acid.

Any starch present can be determined by solution in dilute HCl followed by hydrolysis to glucose (*Brit. J. Nutr.*, 1948, **2**, 7).

Egg Estimations

Methods for the estimation of egg in salad cream, flour confectionery, and in dried egg products are, in general, based either on the determination of phosphorus in extractable phospholipids or of choline liberated by acid hydrolysis. Such analyses present several problems owing to the reaction between egg and starch when these are heated together in cake manufacture and the action of acid on lipids in such products as salad cream.

The method of Daubney and Sexton (*Analyst*, 1950, **75**, 305-9) depends on the liberation of choline from lecithin as a means of determining egg, but in the presence of mustard in salad creams, allowance must be made for choline derived from sinalbin.

Flour Analyses

The estimation of *creta praeparata* in flour has been described by Fraser and Weston (*Analyst*, 1950, **75**, 402). It is based on a gasometric method and the amount present in a sack of flour may be calculated directly from the volume of gas evolved and from factors which take into account temperature, barometric pressure, and the vapour pressure under which the estimation has been carried out.

There is no exact method of determining the extraction rate of a flour, but its grade can be judged in relation to the average run of flours by consideration of its colour (Kent-Jones grader or Pekar test) and of its fibre, mineral matter, and vitamin content.

Meat Products

The presence of certain meats in uncooked sausages can be ascertained by means of the Precipitin Reaction.

If a living animal is injected with small quantities of sterile blood serum, the blood serum of the animal injected acquires the property of producing a precipitate when added in small amounts to the blood serum of the kind of animal employed for the injection or an animal related to it and the reaction is specific. The test is known as the Precipitin Test and the prepared serum is termed Antiserum.

The test can be applied to blood and to saline extracts of uncooked meats including mixed meats, and it is possible to differentiate between blood or meat derived, for example, from the cow, sheep, pig, and horse. A series of rigid controls is essential for the correct interpretation of results.

Meat in Sausages, etc.

The determination of the meat content of sausages, meat pastes, and the like has been described by Stubbs and More (*Analyst*, 1919, **44**, 125; 1940, **65**, 251).

The total solids, fat, protein, and ash are determined by recognised methods and from the results the meat content is calculated as follows:

Total solids − (Protein + Fat + Ash) = Carbohydrate.

Carbohydrate × 2 = Bread filler.

Bread filler × 0·01 = Bread nitrogen.

Total nitrogen − Bread nitrogen = Meat nitrogen.

For beef:

$$\text{Meat nitrogen} \times \frac{100}{3{\cdot}4} = \text{lean beef.}$$

For pork:

$$\text{Meat nitrogen} \times \frac{100}{3{\cdot}6} = \text{lean pork.}$$

Lean meat + fat = Total meat.

The above factors have been found to represent average values and to give satisfactory results.

For fish pastes, the factors for converting nitrogen to fish content are: for cod, 2·65; for herring, 3·37; for salmon, 4·04.

Oils and Fats

Identification of oils and fats depends mainly on the determination of physical and chemical properties, and standard methods are given in "Methods of Analysis of Oils and Fats," B.S. 684: 1950.

Hardened oils can often be identified by isolation of the lead salts of their fatty acids, while examination of many oils is greatly assisted by the ultra-violet absorption technique of Hilditch (*see* Horse Oil).

Edibility tests are based on free fatty acid content, Lea peroxide value, and the Pyke test.

Horse Oil

Horse oil is characterised by its yellow colour, its tendency to separate into a yellow oil and a solid sludge, and by certain phy-

sical and chemical constants. It has an I.V. of 90-100, gives a turbidity at 13°-16° C. by the Evers Bellier test and contains 1-2 per cent. linolenic acid. The presence of this acid can be shown by the spectrographic method of Hilditch *et alia* which measures the ultraviolet absorption of the unsaturated acids before and after isomerisation (*Analyst*, 1945, **70,** 67; 1950, **75,** 336; 1951, **76,** 81; *Biochem. J.*, 1950, **46,** 80).

Welfare Foods

National Dried Milk.—This is produced in Britain by roller-drying, and samples of the daily output of the factories are examined at the Government Chemist's Department to ensure that a high standard of quality is maintained.

The examination includes tests on solubility, freedom from burnt particles and extraneous matter, acidity, and the fat and moisture content.

The determination of solubility is an empirical test recently described by Parsons (*J. Dairy Science*, 1949, **16,** 377), and freedom from burnt particles is best seen by reconstituting the powder with warm water and examining any deposit after standing overnight.

Cod Liver Oil Compound.—This product is required to contain 1,000 international units of vitamin A per g.

The vitamin A content can be determined by measuring the absorption of a solution of the oil in cyclohexane at 328 mμ by means of a Hilger Unispek spectrophotometer and applying the formula:

$$E^{1\%}_{1\,cm.}\ 328\ m\mu \times 1{,}600 = I.U./g.$$

(*See* Morton and Stubbs, *Analyst*, 1946, **71,** 348.)

The Expert Committee on Biological Standardisation (World Health Organisation, Technical Report Series No. 3, February, 1950, Geneva) specifies a factor of 1,900, but this is applicable only if corrections are made for irrelevant absorption.

ADDENDUM

Amending Orders (Miscellaneous)

	S.I. 1951.	
Food Rationing (Gen. Provisions)	1703	(Provision for Certificate of Analysis)
Edible Gelatine	1197	(Revocation)
Eggs (G.B.)	2143	(Consolidation)
Eggs (N.I.)	2144	(Consolidation)
Potatoes (Seed)	1926	
Potatoes (Ware) No. 2	1724	(Consolidation)
	2169	(Amendment)
Table Jellies	1623	(Revocation)

Amending Orders relating to prices

	S.I. 1951.
Bacon	1523
Cereal Fillers	1656
Chocolate, Sugar Confectionery	2067
Eggs	1843
Imported Canned Fish	1561
Imported Canned Fruit	1400
Home-grown Grains:	
Barley	1572
Dredge Corn	2040
Oats	2039
Wheat	2038
Milk	1490
Milk (Condensed)	1722
Sugar	1547

Amendments (Prices)

	S.I. 1951.
Butter	2231
Cheese	2232
Flour	2198

Consolidation

	S.I. 1951.
Invert Sugar	2244

Food Standards

	S.I. 1951.
Edible Gelatine	2246
Fish Paste	2241
Meat Paste	2242

Feedingstuffs

	S.I. 1951.
Rationing	2243

ACKNOWLEDGMENT.—The author wishes to thank the Government Chemist for permission to publish this series of articles.

Future Articles

ARTICLES to be published in forthcoming issues of FOOD MANUFACTURE will include a review of progress in the canning of fishery products; "Mould Contamination in Pork Pies," by Zoë Fowler, B.Sc.; Part II of "The Vitamins," by F. A. Robinson, M.Sc. Tech., LL.B., F.R.I.C.; progress articles on baking and packaging; and an illustrated description of a liquid egg packing factory in Northern Ireland.

Chemical and Process Engineering

BEGINNING with the April issue, the title of our associated journal, "International Chemical Engineering," will be changed to CHEMICAL AND PROCESS ENGINEERING.

This new title expresses more accurately the scope and purpose of this journal which is to record and illustrate progress in the design and development of chemical plant and operations for all industries throughout the world. According to the report of the committee of experts on Chemical Engineering Research, chemical engineering is defined as the study of plant and operations which are generally and widely applicable to all industries. With this conception as the basis of its editorial policy, CHEMICAL AND PROCESS ENGINEERING will continue to improve and expand its service of information for its international readership.

The Confectionery Industry

(*Concluded from page 62*)

ing the gap between supply and demand.

The industry regards itself as somewhat unfortunate in being singled out for reduced sugar allocations in this manner, largely because it is still controlled by the rationing of the end product. In the case of other food industries utilising large sugar allocations, such as preserves, any serious cut in the allocation of sugar would result in the necessity for creating once again a rationing system in these commodities which is considered to be a retrograde step at the present juncture.

There is every indication that even at 6½ oz. redemption of sweet coupons is being maintained at a high level, indicating that saturation has not by any means been reached. There is no doubt, therefore, that the outlook for the confectionery manufacturers as a whole during the coming year is still difficult, with the inevitability of reduced output. In order to solve present-day problems, they are adopting a new approach which disregards any conception of pre-war trading conditions.

Automatic Control in American Food Plants

Leo Walter and Jack Meyer

PART II

The application of automatic control in the American chocolate industry and its use in connexion with such processing operations as spray drying and baking are described in this article, which concludes the series.

THE use of spray drying methods in the U.S.A. is very widespread. For spray drying distillers' solubles, thermostatic control is performed by means of a thermostat bulb in the outlet air from the drying tower. A thermocouple in the outlet duct sets the index of a secondary temperature controller, whose thermocouple is immersed in the hot air inlet duct to the spray drier. The secondary temperature controller actuates a control valve on the oil flow to the air heater. This control method might appear to be rather elaborate, but it compensates for delays and retardations of heat transfer in the furnace. The outlet temperature controller compensates for process characteristics of the drying chamber, and the result is a sensitive cascade control with good responsivity.

For example, if outlet air temperature from the spray chamber rises, thermocouple 1 reacts on recorder controller 1, which in turn varies its link air pressure to recorder controller 2. This altered air-link pressure resets automatically the temperature control point of controller 2, which is normally influenced from air inlet temperature. A new set point for air inlet is thus produced for automatic adjustment of the fuel oil valve to the furnace.

Process Cycle Control

Great progress has been made in recent years in practical applications of programme control, ranging from the simpler time-temperature control of steam jacketed boiling pans to engineered control of cooking retorts, whereby a sequence of operations is automatically performed. There is little difference in instrument design or quality between the equipment used in either country, but in American factories there is a more universal use of programme control.

For example, the use of two recording control instruments on a large steam jacketed boiling vessel applies a pneumatic link between a primary time pattern transmitter, having a cam attachment, and a secondary temperature recorder controller, actuating a steam control diaphragm valve for steam to jacket. In the ordinary way, instrument 2 would hold the kettle temperature steady, but instrument 1 readjusts the temperature set point of instrument 2, in accordance with the shape of the cam of instrument 1. The cam of this time pattern transmitter is driven by a synchronous electric motor, and several cam speeds are available, to be selected according to the desired time-temperature curve and the cam pattern.

Rate of temperature rise, duration of holding period, and rate and duration of cooling period can be worked out by cutting the cam from a cam blank. The cams, which can be used repeatedly, are easily interchangeable for different process cycles. By setting the cam to the proper starting point the operation of the transmitter unit is started.

With this system of using two instruments it is possible to locate all transmitters on a control panel in the engineers' room, while the control instruments are fitted near to the processes. It is also possible to use a single transmitter for several controllers simultaneously for the same process cycle. A few typical applications are beer pasteurising, grain sprouting in malt preparation, and food sterilisation.

Chocolate Tempering

The delicate nature of many foodstuffs makes elaborate control instrumentation imperative, whether for batch processes or for continuous processing. An example for application of time-pattern control is provided by the American chocolate industry. The importance of applying correct temperatures in chocolate tempering is well known, as is the fact that neither the best raw materials nor the best equipment will produce quality chocolate without correct tempering.

The difficulties of replacing hand control of tempering by automatic tempering came mainly from difficult accurate detection of chocolate temperature in the kettle.

One programme control system uses a sensitive thermocouple mounted on the agitator arm, in connexion with a commutator type of switch assembly. Two electronic programme control instruments, as described for time-pattern control, are used. The output air pressure from the controller on the left is conveyed through an air branchline to one throttling control valve for hot water, and to a second cold water control valve. These valves are installed and set so that as one valve opens the other closes. The result is blended water at correct temperature, indicated on the cam instrument. The inflow temperature can thus be varied between hot and cold, according to the desired time-temperature schedule.

Elimination of "Bloom"

Hot and cold water supply temperatures to the jacket and supply pressures must be held steady to achieve the best results. Experience has shown that "bloom" has been eliminated by properly cooling and tempering at a rate most suitable for uniform distribution of fat particles.

A battery of ten time-pattern control systems is illustrated in Fig. 2, showing the control range of a chocolate tempering room in a New York plant. The time-pattern transmitters with adjacent potentiometer recorder controllers are shown, each pair controlling automatically one tempering kettle.

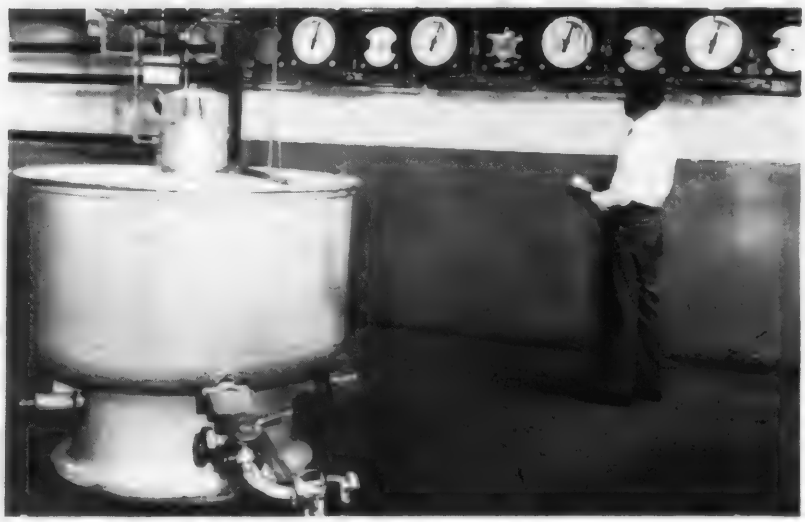


Fig. 2. Time-pattern controllers in a chocolate tempering room.
Courtesy Loft Candy Co., Inc.

Similar instruments are applied in the same factory for chocolate melters, or for each section of a divided melter that is to contain two different blends of chocolate.

Steam and cold water valves are automatically controlled, thus producing a thoroughly melted chocolate for supply to the tempering kettles. Desired melting, cooling, and holding rates are achieved by cutting the cam accordingly. Integral (reset) mode of control is applied to compensate automatically for change of heat load, produced during conversion of cacao fat from the solid to the liquid state. The process cycle is usually as follows: (*a*) warming up of melter, (*b*) mixing and melting of filling with chocolate, (*c*) raising of water jacket temperature gradually to critical temperature, and (*d*) holding.

Oven Zone Control

Modern control of industrial ovens applies zone control, whereby the various oven sections are individually heated and controlled. Recent developments in bakery oven control have resulted in an improved oven design for semi-continuous and for continuous types. The modern tunnel oven for bread baking commonly used in the U.S.A. applies a conveyor band between load and unload side with travelling plate up to 130 ft. long and varying from, say, 6 up to 16 zones. Usually the temperature detecting element for each controlled oven zone is placed in the baking chamber at a point of average zone temperature, which element, however, responds quickly to load changes by variations.

For fuel oil the usual method of control is the two-step (on/off) mode for the oil burner. A modification of this incorporates automatic damper control, which keeps the stack damper open when the oil pump starts, and *vice versa*. The latest developments of oven design, however, favour gradual (throttling) control methods for oil or gas burners by means of pneumatic control instruments.

Importance of Design

Independent multi-temperature recorders indicate on strip charts the various zone temperatures, thus providing a check on controller operation. The important factor for achieving the best control is the design of a bakery oven. Thermal inertia of an oven is usually considerable, and process time lags are, therefore, much more influential on the result of oven control than instrument characteristics. The three most common heating methods employed in America, regardless of oven type, are indirect heating with steam sealed in tubes, indirect heating by combustion gases within tubes, and direct gas-fired ovens with ribbon-type gas burners. It depends entirely on working conditions, on oven type, and on the specified accuracy of temperature control what instrument types are used.

Oil burners are widely used for firing, and pneumatically operated controllers are applied for throttling or cutting out diaphragm motor valves in the fuel oil supply pipe. Flame failure safety devices, such as are also produced in various types in Great Britain, have become standard equipment on oil-fired ovens. They safeguard oven and oven personnel against explosions should ignition fail when the fuel oil supply is turned on. Some flame failure detecting elements use flame electrodes, others operate on radiation heat, while other simpler systems make use of pressure switches to prevent opening of the oil control valve unless the air blower is on.

Developments in Oven Design

Replacement of the smaller batch type ovens, such as draw plate designs, progresses rapidly towards the use of larger semi-automatic or fully automatic oven types, using travelling trays, continuous trays, or tunnel type ovens. Hearth ovens with conveyor are now being made up to 16 heat zones. The designers of double lap travelling tray ovens or of tunnel oven types demanded great flexibility from automatic control systems in instances where a variety of goods have to be baked. Moreover, multiple heating zones necessitated closer temperature control of each heat zone to provide the desired temperature gradient between the load and unload end.

Gas-fired Ovens

Gas firing is also widely applied in America, control methods used being usually indicating dial-set controllers, pneumatically operated, and actuating on adjustable ported gas control valves. The controllers are built-in into control panels on top of the side wall of the middle heating zone, or wherever the panel is best visible to the oven personnel. Control of each zone burner for direct gas-fired ovens is thus achieved, and the series of long ribbon burners in-

stalled across the width of each oven zone receives the correct mixture of gas and combustion air at the correct rate.

Electrical control methods are also used for gas-fired travelling hearth ovens, and one multivolt type controller serves each zone. For example, edgewise indicator controllers are assembled on an oven control panel, and react on motorised gas control valves to burners.

Control of Air Conditioning

Instrumentation of air conditioning plants is highly developed in America, and Fig. 3 shows a pneumatic control system for the dough and proof rooms of a bakery. Air supply to dough rooms is usually through grills near the ceiling, but for proof rooms supply ducts blow in near the floor.

The conventional central air conditioning plant shown uses a dual control instrument of the pneumatic recording type. A wet and dry bulb is the detecting control element, located in the return (recirculation) air duct from the conditioned room. The dry bulb temperature controls gradually steam supply to the heating coils, *i.e.* room temperature, and the dry and wet bulb difference is a measure of air humidity, and is used for humidity control, *i.e.* for "freezing out" moisture by admitting coolant to cooling coils when required.

The combined temperature and humidity control instrument has a circular chart and embraces two mechanisms in the same housing.

Smoke Houses and Cold Stores

From the old crude methods of producing smoke from sawdust or logs, the American meat packer progressed first to additional use of steam coils in serpentine form, then to fan circulation, and finally to automatically controlled special air conditioning plants for smoke houses.

Fully automatically controlled air conditioning systems are also available for cold storage rooms, ranging from "packaged" unit air conditioners to large central air conditioning plants with controlled refrigeration, humidity, and atmospheric composition in the storage space. Controlled quick freezing methods also came into operation on a large scale for a great variety of foodstuffs.

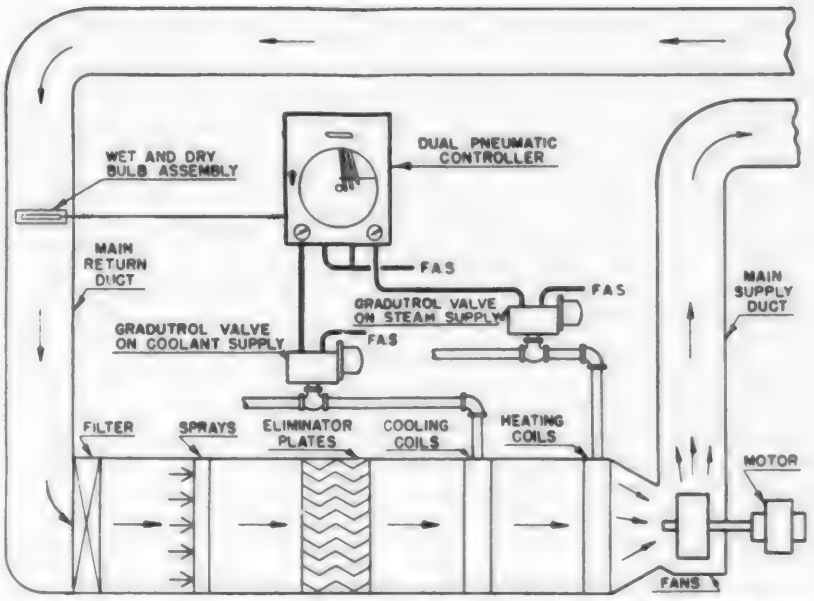


Fig. 3. Pneumatic temperature and humidity control system for dough and proof rooms.

Miscellaneous Control Applications

More recent developments in automatic process control introduced into the food industries such specialised forms of controllers as remote transmission, ratio control, and what is termed "engineered control," with the ultimate target of "robotisation." These special modifications of automatic control originated in the American chemical industry, and have been highly developed in the oil and artificial rubber industry and other chemical plants. Some of them have been applied to modern continuous food production, although on a much smaller scale.

Remote control is widely used and consists of a primary or transmitting instrument, actuating a secondary or receiving instrument. Transmission systems for remote control can be pneumatic, hydraulic, or electric, and the transmitter is usually located near the point of detection of the controlled process variable, *i.e.* near the plant and in good view of the plant operator, whereas the receiver controller is often placed on a central instrument and control panel.

Ratio control uses instruments which control one (secondary) process factor in accordance with increase or decrease of a (primary) uncontrolled factor, which can be temperature, pressure, liquid level, rate of flow, etc. This method is often applied in American air conditioning systems for manufacturing or storage plants for summer air conditioning, by applying controlled refrigeration as demanded from return air temperature, which latter may be influenced by uncontrollable factors.

Another instance where pneumatic set controllers are applied may be control of liquid level in a large vertical vessel, whereby the draw-off of liquid should be performed without altering the liquid level in the tank. One master controller acts as transmitter, and resets a rate of flow controller regulating steam admission to a draw-off pump. The second controller is a pneumatic set instrument, pneumatically connected to the master instrument, which sets the flow rate necessary to hold liquid level steady.

The highly developed industry of non-alcoholic beverages in the U.S.A. uses various types of heat exchangers for heating and pasteurisation of fruit juices. For most of the low temperature fruit juice pasteurisers the usual thermostatic control methods and instruments are similar to those used in Great Britain, but automatic integral (reset) controller

types have to be used for high-temperature short-time pasteurisation of fruit juices.

It is likely that more revolutionary processing methods for foodstuffs will come into operation during the next few years, with consequent demands for even better and lower priced instruments. Improved moisture detection of semi-solid substances during continuous drying might result in automatic speed control of conveyors or of roller driers. Infra-red drying control requires further investigation, but when ultimately established in the food industry will require detecting elements actuated by radiation heat rather than by air temperature. Improved and simplified *p*H control has many possibilities in food manufacture, as has control derived from colour detection.

Trend towards "Robotisation"

The trend in the American industry as a whole seems to be towards what is called "robotisation" in manufacture of goods, whereby automatic controllers direct the plant operations. Such a development has its limits, where the duty of automatic control would become too high. Even the most ingenious control instrument can act only *after* some small deviation of the controlled process variable has occurred. The human operator, on the other hand, can act in anticipation of some change in the process. This and other limitations of automatic control will prevent over-instrumentation. Nevertheless, the scope for more automatic control is still very wide in food manufacture, and the American industry seems very far from saturation point. Vigorous developments in automatic control can, therefore, be predicted with confidence.

The illustration and diagram were supplied by the Brown Instrument Division of the Minneapolis Honeywell Regulator Co. (British Associates Honeywell-Brown Co.).

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Lead in Foods

IN the report presented to the Food Standards Committee by its Metallic Contamination Sub-Committee it is pointed out that lead is a cumulative poison, so that repeated small doses, each of which is too small to produce any demonstrable effect by itself, may in course of time prove toxic. Complete elimination of lead from food and drink is not immediately possible, and the Sub-Committee have aimed at limiting the amounts to the smallest quantities commercially practicable at the present time.

Recommendations of Sub-Committee

They recommend that 12 months' notice should be given before any statutory limits are fixed. The analytical data collected by industries are incomplete and the method of lead determination is complicated. Time is needed for the elimination of lead pipes and containers, the search for lead substitutes, and the revision of certain factory processes, as well as for the development of simpler analytical methods of lead determination, and for analytical surveys.

In the meantime it is proposed that an Industrial Committee should be set up to advise on the technical problems involved, to ascertain whether and to what extent the limits recommended in the report are being exceeded, and to review progress from time to time.

The Sub-Committee recommend that the use of lead piping for conveyance of beer, cider, or any drink other than water (which was outside the terms of reference) be prohibited in due course; further, that the use of lead arsenate sprays for horticultural purposes, of lead-containing materials for packing and wrapping food, of domestic cooking equipment lined with lead-containing tin or pottery glaze, and other important sources of lead contamination be investigated by the appropriate authorities.

The limits recommended in the report for lead in foods and beverages are as indicated below.

Shell-fish and Crustacea

With regard to shell-fish and crustacea in which lead may occur naturally in amounts higher than 2 p.p.m. the Sub-Committee recommend that the sale of these foods containing lead in excess of 2 p.p.m. be permitted if it can be shown that the lead is natural to the fish.

1. *Beverages*

	p.p.m.
Beverages ready-to-drink and not specified below	0·2
Beer and cider provisionally ...	1·0
to be reduced within twelve months to ...	0·5
Apple juice and concentrated soft drinks	0·5

Note.—The limits for concentrates used in the manufacture of soft drinks and not suitable for sale by retail are still under consideration.

2. *Scheduled foods*

	p.p.m.
Colourings	20 (on dry colouring matter)
Dried herbs, spices, dehydrated onions, and flavourings ...	10
Tea	10
Phosphates of ammonia, calcium, and sodium	5
Edible gelatine	7 (already prescribed)
Liquid pectin	10 (provisional)
Canned meats and fish	5

Note.—The question of the limit for solid pectin is under consideration.

3. *Foods other than those scheduled above*

	p.p.m.
Refined sugar and edible oils and fats	0·5
Other foods except those specified in (2) above ...	2·0

Aluminium in the Food Industry

E. Elliott, A.Met., A.I.M.

Never since the industrial revolution has Britain—and the world—been so bedevilled by metal shortages as at present. In time of war, special circumstances operate, almost all available materials and energies being devoted directly or indirectly to the prosecution of its activities. At the present time, however, a balance has to be struck between the demands of a heavy rearmament programme and production for civilian consumption, both here at home and for exports without which we cannot live.

EVEN in countries such as America, where exports are much smaller in volume and importance, metal shortages are being keenly felt, and every effort is being made to alleviate them by conventional and other means. Furthermore, in many cases high demand has had the usual effect upon prices, and it is tempting to large buyers of metals to attempt to find methods of forcing these prices down, by encouraging the use of substitutes and so reducing purchasing pressure upon those materials whose prices may be felt to have been unjustifiably increased.

Substitute for Tinplate

Recently public attention has been drawn to statements made in America about the possibilities of substituting new products, such as an aluminium/plastic sheet and an aluminium-coated steel sheet, for tinplate (FOOD MANUFACTURE, **26**, 11, 427). It would be well to make it clear at this stage that the British aluminium industry does not regard its products as substitutes for any other commodity, metal or otherwise, but is certain that the development of the use of aluminium and its alloys will be along the lines for which they are technically and commercially suited. It is, however, worth detailing the properties of aluminium which make it so admirable a metal for use with food, and considering some of its uses in the food industries, established and envisaged, with the emphasis on those applications where tinned steel and tinplate are also popular materials.

The great majority of foods have no action upon the metal, owing to its inert nature which results from the protective film of oxide always present upon its surface, and which is self-healing after scratching or other mechanical damage. For prolonged contact with certain more aggressive foodstuffs, such as canned foods, the protective qualities of this film may be enhanced by thickening it by anodic oxidation, and lacquer is readily applied either after this process or independently of it. Processes have recently been developed which permit the continuous anodising and/or lacquering of aluminium strip.

Non-toxicity of Aluminium

The products of any action between food and aluminium are non-toxic and without effect upon health, or upon the vitamin content, taste, or appearance of the food. Although the non-toxicity of aluminium has been well established over the years by the satisfactory use of aluminium holloware, a number of investigations have been conducted in this and other countries to place the matter beyond doubt. Perhaps the most exhaustive review of these and of all aspects of aluminium and its alloys in contact with foodstuffs is provided by Dr. J. M. Bryan in the Food Investigation Special Report No. 50, published by the D.S.I.R. in 1948, in which he reaffirms the conclusion of other investigators, that the metal is harmless to food.

Tinplate is very firmly established in food canning, whereas the use of aluminium for this purpose is in its infancy in Britain, although more experience is available in Switzerland and the Scandinavian countries. Apart from the general properties of aluminium, aluminium cans have the advantages of lightness, pleasing appearance, and high re-use and scrap value.

Can Production

At the present time aluminium cannot be soldered with sufficient readiness to allow the manufacture of cans by the traditional methods used with tinplate, but other procedures are available which have their own advantages. Shallow cans such as the ¼ Dingley, so popular for fish products, and shallow round containers, are produced by drawing from strip, and where necessary anodised or lacquered material may be used without damage to the coating. Lids present no difficulties, and are made by the same methods as those applied to tinplate.

Deeper cans require more specialised equipment, and the Keller

Processed peas canned in aluminium alloy. *Photo Aluminium Laboratories.*

Aluminium foil cups. *Photo British Hygienic Containers.*

press which is commonly used makes a deep can in one stroke. Output varies with can size, but cans 74 mm. in diameter by 80 mm. deep are produced at a rate of 5,400 per hour.

With all types of can, lining compounds for sealing the joint between the lid and the lip of the can are applied in the usual way, standard methods are used for filling the cans, and conventional seaming machinery is readily adjusted for making the seal. Processing is best carried out in a pressure retort, designed for pressure cooking and cooling, in order to avoid any tendency to distortion during the heating cycle.

The aluminium materials which have been most commonly used hitherto for food canning are commercial purity aluminium and the aluminium-1¼ per cent. manganese alloy (SIC and NS3 in BS. 1470, "Aluminium and Aluminium Alloy Sheet and Strip"). Both these materials are softer than tinplate, and slightly thicker sheet has often to be used, with stiffening also provided by ribbing or stamping on letters and patterns.

Recently attention has been focused on the possibilities of using a stronger alloy of the aluminium-magnesium-silicon type. This alloy is not at present included in BS. 1470, but is similar in composition to HE9 in B.S. 1476, "Aluminium and Aluminium Alloy Bars, Rods, and Sections." This alloy may be strengthened by heat treatment, and has been used in the solution-treated and temper-rolled condition, that is, quenched from a temperature in the region of 500° C. and subsequently rolled, to give hardening additional to that resulting from the heat treatment and ageing. It has also been used without heat treatment, simply as a work-hardening alloy, although in this condition it has not the strength offered by the former treatment. In resistance to attack by foodstuffs and suitability for anodic treatment, this material is in the same class as the pure aluminium and aluminium-manganese alloy.

Some difficulties have been experienced with aluminium cans owing to collapse after processing, resulting from the vacuum within the can. This form of failure has been confined to the tall A 2½ type can, and flat and squat shapes have been perfectly satisfactory. Present research will no doubt solve the problem as regards the tall can, but in the meantime its absence involves a disadvantage for those who must use this size can.

Chemical Reactions

Chemical action between the aluminium container and the contents of a pack is likely to occur if there is marked acidity or alkalinity, depending also on other substances present in the foodstuffs. Attack is usually accompanied by the evolution of hydrogen and is detected by swelling of the pack; the absence of this hydrogen swell

Aluminium fish crate liner. *Photo Hull Merchants' Amalgamated Box Co.*

is a ready criterion of satisfactory storage.

A few products, such as kippered herrings and sweetened condensed milk, may be stored in untreated metal containers, but for most products it is preferable to protect the metal by anodising, by lacquering or, in some cases, by both anodising and lacquering. The lacquers used on aluminium are similar to those commonly used on tinplate. With deep-drawn containers the lacquer must be sprayed on the interior surfaces after the drawing operation; shallow containers may be shaped from prelacquered sheet as has been mentioned.

Fish products tend to be slightly acid and anodising the metal effectively prevents hydrogen swell; when the pack includes vinegar or tomato sauce, acidity is increased and a lacquer is required in addition, to ensure that no reaction can occur even after prolonged storage.

Other acid products, such as raspberries, strawberries, and plums, also require a container that is either anodised and lacquered, or given two layers of lacquer. Jams, on the other hand, are apparently rendered less aggressive by the presence of sugar and the high viscosity of the product.

On the basis of laboratory tests, canning trials and prolonged storage, the aluminium canning industry has now been established; aluminium packs have been accepted by canners and the public, and their popularity has grown rapidly. Some of the products that may be canned are indicated in the table.

Food preparation trays and bowls in aluminium. *Photo Marks and Spencer.*

FOOD PRODUCTS AND SUITABLE MATERIAL FOR CAN

Product	*Can Material*	*Product*	*Can Material*
Kippered herrings	Unprotected aluminium-manganese alloy	Peas	Anodised aluminium
		Mushrooms ..	,, ,,
Sweetened condensed milk ..	Unprotected aluminium	Carrots ..	Lacquered anodised aluminium
Brisling in oil ..	Anodised aluminium	Cauliflower ..	,, ,, ,,
Sild in oil ..	,, ,,	Parsnips ..	,, ,, ,,
Unsmoked sardines	,, ,,	Beans ..	,, ,, ,,
Fresh fish fillets ..	,, ,,	Asparagus ..	,, ,, ,,
Fishcakes ..	,, ,,	Spinach ..	,, ,, ,,
Cod roe	,, ,,	Kale	,, ,, ,,
Cod liver	,, ,,	Celery ..	,, ,, ,,
Mussels	,, ,,	Liver paste ..	Anodised aluminium
Crab	,, ,,	Blood pudding	,, ,,
Shrimps	,, ,,	Meat cakes ..	,, ,,
Brisling in tomato	Lacquered anodised aluminium	Beef	,, ,,
		Mutton ..	Lacquered anodised aluminium
Sild in tomato ..	,, ,, ,,		
		Fruit, berries, and jam ..	,, ,, ,,

Other Uses of Aluminium

In addition to canning, the other applications in which tin and aluminium are both used must not be lost sight of. General line containers such as biscuit tins are entirely made of aluminium and lend themselves to some extremely attractive schemes of colour decoration. Collapsible tubes are not commonly used in this country for food packaging, in either aluminium or other metals, but on the Continent condiments, condensed milk, jams, and the like are sold in this way, all in aluminium tubes, and this seems a pointer to the future over here.

Aluminium foil has all the advantages in contact with food mentioned earlier in this account, and it is considerably cheaper than foils in other metals. As a wrapping for dairy products it is admirable, and a British Standard was published in 1950 (BS. 1683) for coated aluminium foil for the wrapping of cheese. Foil caps for milk bottles, usually attractively decorated by lacquering, require about 5,000 tons of aluminium foil per annum for their production, and have ad-

Aluminium steam jacketed boiling pans, many of which are over 30 years old. *Photo C. Shippam.*

Aluminium brewery fermenting vessels installed in 1922, 1928, and 1929.
Photo The A.P.V. Co.

vantages over other methods not only in hygiene but in application and removal.

Chocolates and sweets are kept in perfect condition by aluminium foil wrapping, as the material is a first class moisture barrier. Sealed bags for small quantities of various foods may readily be made from a laminate of foil and heat-sealing plastics, and a new food container formed from heavy-gauge foil in the shape of a small tub with a separate lid is expected soon to be generally available.

Food Preparation and Processing

All the above applications of aluminium in the food industries are concerned primarily with packaging. The properties of aluminium and its alloys render them also particularly suitable for use in food preparation and processing. To go into details of such uses is outside the scope of this article, since the branches of the industry in which aluminium equipment and plant are employed are numerous, including dairy products, fats and oils, bakers' products, meat and fish, beer and other beverages, and fruit and vegetables.

Semi-fabricated Products

The metal is used in many forms, such as castings, tubes, sheet, and plate, mainly in the pure metal and the aluminium-manganese alloy although other alloys are also applied in special cases. These semi-fabricated products are made up into equipment such as evaporators, distillation equipment, ducting systems, brewery fermenting vats, and road tankers.

Aluminium is in every-day use in the food industry from the beginning of many processes to the end—from the fruit picking tray to the jam pan, from the fish-hold lining to the fish can, from the milking pail to the bottle cap, and from the meat van to the frying pan.

Increasing availability is all that is now required to ensure increasing use, and while schemes at present developing will ensure that the ingot metal is provided, the semi-fabricating capacity is ready and waiting.

Uses for Peanuts

PROGRESS in research to give peanuts greater usefulness in both edible and industrial products was recently reported by Andrew F. Freeman and Jett C. Arthur of the U.S. Department of Agriculture's Southern Regional Research Laboratory.

Improvements in Peanut Butter

Pilot plant studies at the laboratory are providing information leading to an improved peanut butter through a better understanding of the relationship between processing conditions and quality. Results so far indicate that careful control of temperature in roasting the peanuts gives a more uniform peanut butter from the standpoint of spreadability, colour, and longer retention of freshly roasted flavour. Thorough analyses were made at all stages of the laboratory processing, in order to learn more about what conditions are best for roasting, and also for other steps in peanut butter manufacture.

Keeping Quality Tests

Analyses have also been made at intervals after storage to ascertain the effects of different processing conditions on the keeping quality of peanut butter. In addition, the stored peanut butters were evaluated by a panel of experts on taste, flavour, and odour. Although chemical tests revealed an appreciable change in the oil extracted from peanut butter after three months' storage, no changes could be detected by taste tests for products stored as long as nine months.

The laboratory has identified as tocopherols the naturally occurring protective substances which keep peanut oil from becoming rancid; these may be removed by a distillation process. Either natural or synthetic vitamin E has been found to extend the keeping time of oils which do not naturally have good keeping qualities. Other valuable information about the physical properties of peanut oils, leading to greater and more effective use in such products as cooking oils, shortenings, margarines, and stabilisers for peanut butter and bakery products, has also been obtained.

Peanut Meal and Protein

Peanut meal and protein have potentially new uses for food and feed, as well as for industrial products. The Southern Regional Research Laboratory recently has supplied samples of peanut meal prepared in its pilot plant by the solvent-extraction process, and also samples of the protein obtained from such meal, for evaluation by a number of industrial concerns and universities engaged in nutritional studies. In the field of non-food uses, the laboratory has produced experimental fibres, glues, and adhesives from peanut protein, which have been tested commercially. Commercial development of these products, however, depends upon the availability of suitable peanut meal and protein.

Lipase in Oats

T. Moran, C.B.E., D.Sc., Ph.D.
The Research Association of British Flour-Millers

The most serious deterioration that occurs in oatmeal products is caused by the action of the enzyme lipase on the fat content which results in the production of free fatty acid and glycerol. Investigations have been carried out at the Research Station of the Association of British Flour-Millers to study this and many other problems connected with oats and oat products.

GROATS contain a relatively high proportion of fat. The amount is dependent on variety and in the case of Reliance may be as low as 4½ per cent. in contrast to 9-11 per cent. for Grey Winter and some of the Scotch Potato varieties.

Oats also contain the enzyme lipase. During the storage of oatmeal or oatflakes containing free lipase, the enzyme tends to split the fat into glycerol and free fatty acids. If storage is prolonged most of the fat will be broken up in this way.

This splitting of oat fat during storage is undesirable. It leads to off-flavours and furthermore, while there is no statutory limit for the amount of free fatty acid in a sample of oatmeal or flakes, the average Public Analyst will look askance at a sample if the free fatty acid content, based on the weight of meal, exceeds about 2 per cent. In freshly prepared oatmeal an average figure will be in the range 0·2 to 0·6 per cent. Our interest in this problem was in fact stimulated by a Public Analyst who in a commercial sample of oatflakes found a free fatty acid content of 5 per cent. We understand that, based on this analysis, this sample of oatflakes could have been condemned as unfit for human consumption.

At St. Albans Dr. Hutchinson and Mr. Martin have spent a considerable time developing methods for the measurement of lipase activity in oatmeal and oatcakes. In this way we attempt to predict their behaviour on storage and when used in oatcakes and biscuits.

Lipase, like all enzymes, is destroyed by heat. However, during, for example, kilning, much of the lipase escapes destruction because in this process the oats are dried to a low moisture content. The drier the oat the higher is the temperature required to destroy lipase, and once it falls below about 12 per cent. the normal kilning temperature is not sufficient. Even in the better meals we have found that some 30 per cent. of the lipase survives the kilning process.

This interplay of moisture content and temperature of inactivation of lipase is shown in the accompanying table, which gives over a range of moisture contents the temperatures required to inactivate 97-98 per cent. of the lipase in one hour.

Moisture content of groats per cent.	*Temperature F.*
6	248°
8	219°
10	198°
12	181°
14	169°
16	160°
18	154°
20	148°

With regard to the duration of heat treatment at a particular moisture content, as a rough approximation, reducing the time by a half would require an increase in temperature in the grain of 4° F. in order to obtain the same destruction of lipase.

The Steaming Process

Steaming obviously offers a certain method of destruction because during this process the moisture content of the grain is relatively high, certainly well in excess of our limit of 12 per cent. Furthermore the temperature of the grain can be raised very quickly during the steaming process. Consequently when oats are adequately steamed we have found that all the lipase is destroyed; two minutes at a temperature of 205° F. is sufficient. A practical difficulty is to ensure that every grain in a steamer is uniformly heated to this temperature.

Some oatmeal millers have been quick to realise this application of the steaming process and we have examined many samples for millers who have investigated it. Steaming as one step in the production of oatmeal did raise some doubt in our minds as to whether it might not jeopardise the production of the traditional oatmeal flavour in the subsequent kilning. We have not yet finally cleared up this point but our evidence so far suggests that our fears were groundless.

Other Methods of Destruction

Naturally we have searched round for other methods of destroying lipase. To do this it was a prerequisite to find out where lipase is present in groats. This has involved us in a lot of detailed and laborious experiments, but briefly stated we find in effect that all the lipase is contained in the outer skin or pericarp of the groat. This is a most surprising finding and in fact of great scientific interest.

On the practical side, however, it has suggested novel methods of destroying lipase. For example, we find that if groats are soaked in dilute hydrochloric acid their lipase activity is reduced by at least 95 per cent. in half an hour. During this immersion the increase in water content of the groats is of the order of 5 per cent. This pick-up of water is a nuisance but the acid treatment in no way affects the flavour of the grain and is not objectionable on nutritional grounds.

An even more promising method, however, has been discovered. If groats are put into water for about two minutes the pericarp (except for that in the crease) is sufficiently loosened to permit its easy removal by simple

Reproduced by permission of the Research Committee of the Oatmeal Millers of England and Scotland, to whom it was originally circulated as a confidential report.

brushing. In this way at least 90 per cent. of the lipase can be removed. The detached pericarp could, of course, be collected and incorporated in animal feed. Incidentally the percentage of the groat that is removed by this brushing is about 1½ per cent. of its weight.

Improved Colour of Meal

There is again a pick-up of water during this wet brushing but in a suitable plant it should be possible to reduce it to a low figure, possibly of the order of 2 per cent. The groats after treatment are much improved in appearance and would require no polishing. Furthermore, apart from the destruction of lipase, they yield a meal of superior colour.

As an example, using the Kent-Jones and Martin colour grader, we find that the ground groats before treatment gave a colour figure of 17·1, whereas after the brushing this figure was reduced to 12. In addition the fibre figure of the groats was reduced from 1·3 per cent. to 0·8 per cent. It would seem to us, therefore, that this process, suitably applied, may have some application in oatmeal milling. So far, we have carried out the brushing process in ordinary water, but it might be better to use acidulated water.

There is an interesting botanical point. Probably the most sensitive way of showing that grain is not seriously damaged by a particular treatment is to demonstrate that its germination vitality is unimpaired. It is an interesting fact that both the acid and brushing treatments do not affect the germination of groats. Again this is an observation of obvious scientific importance and we propose to follow it up when the opportunity occurs. One wild possibility—and it is a very wild one!—is the production of a lipase-free oat by the growing of such treated seed.

Food Colours and Flavours in Canada

DEFINITIONS of food colours and flavours according to Canadian practice, together with the rate of duty, are given in Divisions 6 and 10 of the Food and Drug Regulations of Canada. British products are admitted duty free in some cases, but a Federal sales tax of 10 per cent. is imposed on all such products whether domestic or imported. Import licences are not required.

All food flavours and food colours must conform to the regulations under the Canadian Food and Drugs Act, copies of which are available for reference at the Commercial Relations and Exports Department (Industries Branch) of the Board of Trade, Horse Guards Avenue, London, S.W.1.

No figures of Canadian production are available, but details of imports, classified by commodity and source, have been compiled.

Generally speaking, there is a seasonal demand, the highest peak occurring in June, July, and August in industries producing ice cream, carbonated beverages, and gelatin desserts. Lesser peaks occur prior to festive occasions. For household flavourings and colours demand is greatest in December, January, and February, and very small in the summer.

There is little scope for very high quality flavours if these cost a great deal more than ordinary qualities, but as the cost of flavour content per unit of food product is small, high quality natural products tend to replace synthetics. There has been little change in the list of permitted food dyes over the past 15 years. Quality of approved colours varies very slightly.

Special flavouring material is supplied for a number of products, ranging from baked goods and confectionery to dental preparations, mouth washes, and prepared foods of various kinds. In general, Canadian flavour preference is closer to British tastes than to American, with certain distinct national and local likings.

Flavours of California orange, Messina lemon, and Canadian raspberry and strawberry are required. Butterscotch flavour in Canada is quite different from that in England.

Large producers of ice cream throughout Canada tend to use true fruit juices or frozen fruit, and the same is true in the confectionery field. Bakers use very little spice. In goods of long shelf life, such as antibiotics and slow dissolving "breath" tablets, the use of terpeneless oils is decreasing, since the newer antioxidants permit the safe use of natural oils without danger of rancidity. Concentrates and oleo resins are increasing in popularity, while blandness is sought in catsups and salad dressings. This does not apply to Quebec, where French-Canadian taste demands a highly spiced product.

Typical packages are 1 or 5 lb. containers and 1 pint and 1 gal. bottles. Fortified food flavours must have these details on their labels: 1. The percentage by weight (on a diluent-free basis) of flavouring extracts derived from the natural source for which the flavour is named. 2. As an integral part of the name, the words "artificial" or "imitation" or "fortified." Coal-tar food colours must bear inner and outer labels showing conspicuously the lot number of the coal-tar colour and the words "Food Colour."

Speciality salesmen are common, and there is a noteworthy trend towards "Customer Flavouring under Private Formula." Local flavour houses develop a colour or flavour blend for one customer exclusively, under a private formula number and against a firm annual delivery contract. The purchaser's own label can be supplied by some manufacturers in many cases.

United Kingdom firms wishing to enter the Canadian market should note that blending facilities must be provided, that it is almost essential to open a branch, that specialisation is increasing, and that production is in the hands of a few major operators. No particular preference exists for country or origin, but price is important, and there are rumours of the Germans entering the market with a complete range of primary colours considerably cheaper than U.K. or U.S. products.

(Condensed from a Board of Trade Report.)

Fourteen Books in One

It is nearly two years since the previous edition of Food Industries Manual was published and in the substantial additions and revisions of the seventeenth edition, just published, is reflected the course of the advances in the food industry.

ARRANGED alphabetically for easy and rapid reference are the fourteen sections of the new edition,* each of which constitutes an epitome of the particular industry to which it is devoted.

The first section, **Milling, Flour, Baking, and Flour Confectionery,** has been revised by T. H. Fairbrother, M.Sc., F.R.I.C., the last revision he will make; his recent death will be felt by all who knew him. Fairbrother had taken care of this section throughout the seventeen editions.

Between the items under A and Z, milling, breadmaking, and flour confectionery are discussed from the technical and practical points of view.

Linked up with the different items are concise but clear descriptions of the plant and machinery involved in the different operations.

Official and other methods of analysis of wheat and flour, as well as baking tests and bacteriological data have their due place in this section.

The subjects of **Sugar Confectionery, Jams, and Jellies,** have been thoroughly overhauled by an old-standing contributor, J. Valentine Backes, A.R.C.S., D.I.C., A.R.I.C., and collaborators.

The descriptions of plant and its handling have been well done and recent developments duly recorded, while notes on the testing of raw and finished materials have not been neglected.

Canning and Preserving has been in the hands of the original contributors, F. Hirst, M.Sc., A.R.C.S., Director of Campden Research Station, and W. B. Adam, M.A., F.R.I.C., Deputy Director of the same Station. J. R. Burrell has also contributed a new chapter on fish canning.

The names of the compilers are sufficient evidence of the authoritative nature of their contribution, which covers a great deal of ground in the space available.

The subject of **Meat Products** has been handled by T. Crosbie-Walsh, F.R.I.C., who is also General Editor of the Manual. The curing of bacon, the manufacture of extract of meat, and fillers and flavourings for sausage manufacture form useful and practical chapters.

The section on **Pickles and Sauces** is by E. F. Eaton, F.R.I.C., who has contributed this in many previous editions. It is a concise and clearly written exposition, embracing many useful formulae and tips on manufacture. A chapter on vegetables and vegetable brining is well documented.

The next section on the **Dairy Industry,** which was thoroughly revised and rewritten a few years ago, by J. G. Davis, D.Sc., Ph.D., F.R.I.C., has been revised by the same contributor.

Milk, cheese, butter, refrigeration, pasteurisation, laboratory control, and legal aspects are among the multiplicity of items treated. Useful references to current literature are given.

The subject of **Food Dehydration** has been treated from the point of view of the plant and equipment involved in its preparation. Useful data on the nutritive value of the products are included.

Edible Fats has been covered by R. Child, B.Sc., Ph.D. (Lond.), F.R.I.C., in a way that has presented the maximum amount of information in the minimum of space. The section has been treated from the industrial angle throughout and references to the literature are copious.

The section on **Fruit Juice Products,** which was first published in the fifteenth edition, is a compilation prepared by the staff of the laboratories and technical section of H. W. Carter and Co., under the supervision of V. L. S. Charley, B.Sc., Ph.D. Here again the treatment, while possessing the necessary technical and scientific background, has a practical trend.

Food Storage and Refrigeration has been compiled by a number of contributors, and forms a useful guide to present-day procedure.

Food Handling Equipment, compiled by Frank H. Slade, A.M.I.Mech.E., epitomises the main items of plant necessary for the conveyance of materials from one part of the factory to the other, while the section on **Packaging** contains up-to-date and practical information on the packaging of foods.

One of the most important parts of any factory is **The Boiler House,** the economical conduct of which cannot fail to influence costs. This section was compiled by the late H. C. Appleby, M.Inst.F., A.M.I.Mech.E., who had had a wide experience in fuel economy.

The sections on the composition of foods and the lists of suppliers of plant and materials, and trade names and marks, together with a comprehensive index, complete a work the acquisition of which is a "must" for the food manufacturer.

* *Food Industries Manual.* 17th Edition. Edited by T. Crosbie-Walsh, F.R.I.C. Pp. 1036+lxxxviii. Leonard Hill, Ltd., London. Price 42s.

News from the Industry

FORTHCOMING EVENTS

Royal Institute of Chemistry

Included in the programme of meetings arranged by the Royal Institute of Chemistry for February are the following:

Feb. 20. "The Organisation of the Chemical Profession in the U.S.A.," by R. L. Kenyon, Ph.D., at 6 p.m. at the Waldorf Hotel, London.

Feb. 23. A Symposium on the Metabolism of Calcium and Phosphorus, at 2.30 p.m. at Reading University.

*

Food Group Tour, 1952

At a meeting of the Food and Agriculture Groups Tour Committee of the Society of Chemical Industry, it was decided that this year's tour will be to Holland. It has been provisionally arranged that eight visits should be made during the tour as follows: essences and essential oils factory; gin distillation plant; land reclamation scheme; dairy plant; deep freezing plant; baking and flour confectionery factory; a cannery; and a brewery. It is also hoped to arrange a visit to a Delft pottery.

Those taking part will arrive at Amsterdam on Saturday, May 24, and leave for the Hague on Wednesday, May 28, travelling home on the following Sunday.

*

Society of Public Analysts

The Annual General Meeting of the Society of Public Analysts and Other Analytical Chemists will now be held in the meeting room of the Chemical Society, Burlington House, Piccadilly, London, W.1, on Friday, March 7, 1952, at 4.30 p.m. followed by the Bernard Dyer Memorial Lecture at 5 p.m.

Collapsible Tube Advisory Service

A packaging advisory committee for food and other industries has been formed under the auspices of the Collapsible Tube Manufacturers' Association, by which facilities will be available to collapsible tube users in respect of technical, commercial, chemical, and scientific problems.

Those firms represented on the committee are Betts and Co., John Dale, Ltd., Flexile Metal Co., Invicta Foil and Cheswright and Nicholls, H. G. Sanders and Sons, Universal Metal Products, and Venesta.

Estimation of Synthetic Detergents

A new disc to be used with the Comparator has been made available by The Tintometer Ltd. for the estimation of residues of anionic synthetic reagents in utensils, etc.

Vined Peas for Canning

As a result of the negotiations which have recently been carried out between the Vining Peas Sub-Committee and the Fruit and Vegetable Canners' Association, prices for vined peas for canning for the 1952 crop have been agreed as follows:

	per cwt.
Early varieties	43s. 6d.
Main crop	39s. 6d.

These prices are on the basis of delivery to the viner, whether at the factory or in the field. It was agreed that where extra services are provided by the grower, such as "manning" the viner or delivering over a long distance to the viner at the factory, these should be covered by private negotiations between the grower and the canner.

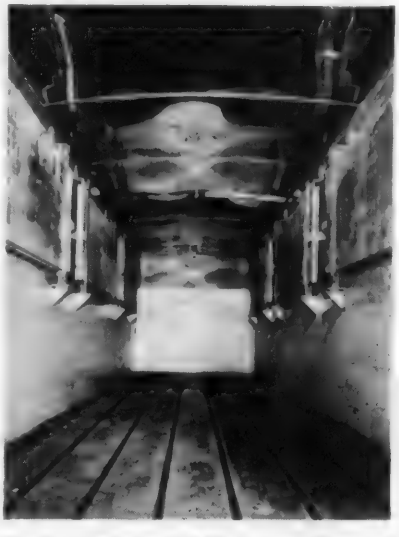
No arrangements were made to negotiate prices for peas for quick freezing and these were not discussed at the joint meeting.

Refrigeration on Wheels

Delivery of the first of a fleet of mobile, independent, refrigerating plants has been taken by John Connell (Bromley).

The problem of efficient and hygienic distribution of fresh frozen foods is one of national importance and interest and the company have devoted a great deal of time, thought, and money in an effort to provide the trade with this type of commodity in perfect condition.

Eventually the company hope to have a fleet of these 10 ton (800 cubic feet) cold stores on the road, each distributing fresh frozen goods, poultry, rabbits, etc., straight to retailers throughout the country.



The interior of one of the new refrigerated vehicles for distributing frozen foods.

Sales Managers Confer

About three hundred members and others attended the one-day conference on the avoidance of waste in distribution held by The Incorporated Sales Managers' Association at the Connaught Rooms on December 7.

At the first of three sessions, methods for assessing the market and selecting the target were examined and discussed. The training and briefing of the sales force was the subject of the second session.

At the luncheon, Lord Luke, chairman of Bovril Ltd., was installed as President of the Association.

At the last session in the afternoon, methods for securing the co-operation of distributors were discussed and illustrated by extracts from films.

Mr. W. E. Wheatley, immediate past chairman of the Association summed up and closed the conference.

Donation towards Research

A further gift of £500 has been received by the British Baking Industries Research Association towards its current research work. The donation is the balance of a fund raised by the trade in the north-western area in recognition of the services of Mr. F. O. Birkett, as area Bread Officer during the war. As this sum has been given for current research work, it earns an equivalent amount of Government grant.

New Sandwich Preparation

Cutting, spreading, and filling, and the buying of sandwich ingredients become unnecessary through a new invention from Cadby Hall. This is the Dandy, a sandwich which is deep frozen immediately after packing, and which retains its freshness up to twelve hours after purchase. It needs no preparation whatever, and thaws out naturally at normal room temperature.

The sandwiches are obtained in packets of fourteen, and are made up of ham, creamed blue cheese, creamed cheese and gherkin, walnut, or pickle, sardine, or cheese and tomato spread.

Packaging on the Screen

The chief object of a sound film, sponsored by Samuel Jones and Co., is to demonstrate the general improvement in packaging standards. The opening sequences depict how the sealing of a parcel should not be carried out, followed by demonstrations as to the correct and most economical use of gummed sealing tape in the packing of bales, containers, and parcels.

APPOINTMENTS

It has been announced by I.T.D. Ltd., the selling organisation for Stacatrucs, Aerolift fork trucks, and Electricar works trucks, that Mr. R. T. Hartmann, M.A., is no longer connected with the company. Mr. A. C. Cooper, who until now has been United Kingdom Division Manager, will be acting sales manager of the company in charge of both home and overseas business.

*

Owing to business obligations in the U.S.A., Mr. Edgar Monsanto Queeny, chairman of Monsanto Chemical Company, U.S.A., has resigned from the Board of Monsanto Chemicals. Mr. L. A. Lewinton, who has for some time acted as alternate Director for Mr. Queeny, has been appointed a Director of the company in his place.

*

Mr. Ivor Salmon, youngest son of the late Mr. Alfred Salmon, a former chairman of the company, has been elected a director of J. Lyons and Co.

New Branch Opened

To meet increasing business and for the convenience of customers in the Leeds and district area, J. H. Fenner and Co., power transmission engineers and manufacturers of V-belts and pulleys, have opened an additional branch at 32, Dewsbury Road, Leeds, 11, under the management of Mr. F. Grindlay.

Changes of Address

The Institute of Packaging has moved into new quarters at 20-21, Took's Court, Cursitor Street, London, E.C.4. (Telephone: CHAncery 8484.)

*

The Midland Area Sales Office of Tufnol Ltd. is now at Cornwall Buildings, 45, Newhall Street, Birmingham, 3.

The telephone number Central 5651 remains unaltered, but the telegraphic address has been changed to TUFNOL, Birmingham, 3.

Fruit Growing in Scotland

The successful expansion of fruit growing in the Moray Firth area is to be followed up by an expanded delivery to markets throughout Britain. The main emphasis will again be on quality, since it was this factor which largely assisted in securing quick acceptance of the area as a source of production. About 100 growers are now linked through the Moray Firth Fruit Growers' Association which is co-ordinating the work.

Further experimental deliveries of strawberries to New York by air will be attempted this year, provided conditions prove suitable. It is stressed that this is still experimental work and that the major outlets will lie in Britain.

In addition to concentration on high grade fruit for table use, the area is interested in the preserve trade and a factory was taken over for the processing of surplus fruit.

Raising the Status of the Iced Lollie

In the "List of Suppliers" given at the end of the article published in our issue of January, 1952, describing the iced lollies factory of Frozen Confections Ltd., the following details were omitted:

The main contractors were the S. B. Engineering Co., Ltd. who designed and engineered the supply of some twenty major items for the factory. These items included the ammonia compressor complete with all ancillaries, such as condensers, intercoolers, water cooling tower, the cold room and its refrigeration equipment, the heat treatment equipment, sterilising unit, storage vats, agitator, and all electric motors and starters. Furthermore, the investigation and design of a special resilient sound-proof base for the ammonia compresser was undertaken.

It is of interest to gather that, although final instructions were not received from Mr. T. T. Campbell Garratt until March 9, 1951, the whole plant was supplied, installed, and set running in May of the same year.

*

Mr. J. W. Nicholls, Mayor of Twickenham Corporation, informs us that Hampton Wick is in the borough of Twickenham and the county of Middlesex, and not in Surrey as mentioned in the same article.

RETIREMENTS

Mr. Crawford T. Robertson, for 44 years buyer at G. and J. Weir, retired on December 28 after 51 years' service with the firm.

The managing director, Mr. J. K. Weir, presented Mr. Robertson with a wallet of notes, and a handbag for Mrs. Robertson.

*

Mr. R. L. Barnes, Commissioner of the United Kingdom Tea Bureau since its foundation in 1934, retired on January 12 on attaining the age limit.

Mr. Barnes is succeeded as Commissioner by Mr. D. M. Forrest, Deputy Commissioner.

*

Mr. C. T. Royle, secretary of East Malling Research Station, retired on December 31, 1951, after 18 years' service. Since he took up his post in October, 1933, the experimental farm has doubled in size and the research staff quadrupled.

He is succeeded by Mr. T. R. Littlehales who has been working with him as his assistant since January, 1950.

*

A farewell dinner was held at the Hyde Park Hotel on January 3 to mark the retirement of Mr. Thomas Burgess Scotcher as chairman of Lipton, and a director of Home and Colonial Stores.

Sir Lancelot Royle, chairman of Home and Colonial Stores and newly elected chairman of Lipton, presided, and presented Mr. Scotcher with a silver salver with facsimile signatures.

Flavours and Essences

Specialising in the production of essences and flavours for the bakery, ice cream, and mineral water trades, the Birmingham Chemical Co. has, since the war, effected considerable replacement of plant at its Lichfield factory and has developed new flavouring mediums to meet the demand by other industries using flavours.

Christmas Parties

Members of staff and friends in the trade attended an enjoyable Christmas party given by S. Daniels and Co. at The Talbot Restaurant, London Wall, on December 21.

*

More than 150 children from local childrens' homes were entertained at a matinee performance of "Ali Baba" presented by the A.P.V. Amateur Theatrical Society. Two other performances were also given, one of which was attended by 25 patients from Queen Mary's Hospital, Roehampton.

*

The annual staff party and the childrens' party given by R. Fry and Co. took place on December 28 and 29. Both events were organised by the Social Committee of the Fryco Club.

OBITUARY

Mr. James Voase Rank, on January 3.

By reason of his lifelong knowledge of the flour milling industry and his ability as a miller and a business man, Mr. Rank was acclaimed as the leader of the industry in this country.

Following the outbreak of the second world war, he was appointed Director of the Cereals Import Division, a post he occupied until his death.

He was also prominent in many other branches of industry and sport.

*

Mr. Thomas Henry Saxby, of Wilby, Northants, at the age of 82.

Mr. Saxby was due to retire at Christmas after 64 years with the flour milling firm of Hipwell and Sons, Sharnbrook.

The Electropower speed reducer.

Gear Boxes

Designed to transmit powers from $\frac{1}{8}$th up to 25 h.p., the present range of spur gear boxes, manufactured by Electropower Gears, incorporates standard ratios which allow for a wide selection of final output shaft speeds. The boxes can be conveniently driven by means of direct flexible coupling, flat belt, or rope pulley drive.

Advertising for Food Manufacturers

If effective advertising is to be reasonably assured, an advertising agency must at least possess the following qualifications:

(*a*) A complete understanding of the product with all its implications for the consumer, the trade, and the manufacturer.

(*b*) The ability to identify who and where are the most likely buyers of the product.

(*c*) The knowledge of how to reach the greatest numbers of potential customers in the most economical manner.

(*d*) Having reached such customers, the ability to know how to sell the brand as distinct from others.

In current conditions, it is doubtful whether even these abilities will be sufficient. Advertisers expect their agencies to have additional qualifications. They must be sound and reliable business partners with experience and judgment to bring to marketing, selling, and, at times, even production problems.

Creative flair is essential if distinction is to be achieved and attention and interest are to be gained and held, always bearing in mind the manufacturer's main and sales policies and their immediate and long term development.

Planned advertising on these lines is undertaken by Graham and Gillies, who have a wide experience of the advertising requirements of food manufacturers.

Slotted Angles for Structural Work

An exhibition, showing the wide range of uses of Dexion slotted angles, was held in London recently. The material consists of ten-foot lengths of special patented slotted metal angle which can be cut into various lengths and bolted together, on the Meccano principle, to build up many different kinds of structure. Its applications in the food industry cover such items as trolleys, castors, conveyors, belt guards, and canteen installations.

Service Presentations

Mr. Bernard Gillingham, who joined J. Lyons and Co. when tea was packed and labelled by hand in a small Kensington factory, has been presented with a gold watch to mark his fifty years' service with the firm. He is now estate manager of Lyons factory at Felix Road, Bristol.

■

Mr. Stanley Brightwell, who spent Christmas in Nottingham General Hospital with a fractured ankle, was visited there by Mr. D. R. D. Astill, managing director of the food products factory, Newball and Mason, who presented him with a cheque in recognition of his 47 years' service with the factory.

"Safety" Colour Code

During recent years increasing attention has been paid to colour coding of danger points in factories to indicate high voltage lines, toxic gases, and obstructions such as low doorways, steps, and other hazards, and a committee of the British Standards Institution, representative of a wide variety of experience, has been considering the possibility of preparing a "safety" colour code in order to secure unification of the present different practices.

The Royal Society for the Prevention of Accidents made an extensive enquiry on behalf of the committee; as a result of this and other investigations, it has now been decided to abandon the attempt to prepare a code.

Examination of the problem showed that a distinction must be made between a *safety* colour code and an *identification* colour code; the purpose of the former is, broadly, to classify types of hazard and to give warning of them by colour, while the object of the identification code, is primarily to identify by colour the contents, any application to safety being incidental.

It was the former type of code that the committee had to consider, and it was found that many colours had traditional connotations which, while not always consistent, were so well known that they could not be reconciled.

The second difficulty was that as the only truly satisfactory method of ensuring safety is to eliminate the hazard, the committee felt that a code might encourage identification of hazards by colour instead of their removal.

Thirdly, the increase in the scientific use of colours for decoration to secure better light and to improve working conditions detracted from the effectiveness of a safety colour code, and these schemes of colour treatment were considered to be more effective in the reduction of accidents.

A fourth and important point arose from positive evidence submitted showing that the significance of colour codes put into effect had been quickly forgotten; while this is relatively unimportant in the case of an identification colour code where time is not vital, it was felt that it would militate seriously against the use of a safety code where recognition and significance of colour must be immediate and instinctive.

Board Changes

Following the recent resignations of Hugh Wylie, C.A., Lord Westwood, O.B.E., J.P., V. H. McGrattan, and H. E. Chipperfield from the Board of Peerless and Ericsson, and the addition of W. F. Hammond, the present directorate consists of Sir John Fox, O.B.E. (chairman), J. Morris, Dr. George Lewi, and W. F. Hammond.

Sherry Display Stand

Made of aluminium and printed in four colours, the new sherry display stand designed by the Metal Box Co., has a riveted strut that hinges out to form the rear support. It has a slight backward "lean" which affords an effective tilt to the bottle displayed. The portion cut away to accommodate the bottle is printed at the same time as the main front of the display and cut out afterwards, thus forming a miniature showcard to be displayed separately in windows or on counters. The whole stand folds flat for ease of despatch.

BOOKLETS RECEIVED

The third issue of the F. J. Edwards magazine contains, among other items, short stories, a fantasy of Arabia, and a competition. This publication links together the staffs of the company's three factories at London, Birmingham, and Chard.

■

The latest technical information bulletin issued by Marconi Instruments contains articles on ignitron switching for radiographic timers, the suspended coil galvanometer, visual alignment with the television sweep generator, and the design, construction, and operation of the signal generator.

■

The purpose of a recent booklet published by Cherry-Burrell is to provide the plant owner and operator with a practical guide to the care and maintenance of stainless steel equipment.

■

A brief outline of the history and products of the company is contained in a well-produced booklet issued by Negretti and Zambra in celebration of their centenary which took place in 1950.

■

An instruction manual dealing with the care and maintenance of North P.V.C. gloves and clothing has been published by the manufacturers, James North and Sons.

■

The second issue of *Bowater Papers* which has recently been published contains some interesting articles on the use of corrugated containers, the behaviour of the new British Standard inks and the preparation of blocks appropriate to them, and the composition and use of sulphite liquor.

■

The latest edition of the "Holbrook Bulletin" contains an interesting article on the company's South Africa factory which went into production only six months after the laying of the initial plans for its establishment.

■

The principles of economiser design and a description of the various types of plant manufactured by the company are given in a fully illustrated booklet issued by Senior Economisers.

COMPANY NEWS

At a Board Meeting held on December 11, 1951, the Directors of Allied Bakeries considered the payment of a dividend in respect of the 52 weeks ending March 28, 1952, and have declared an Interim Dividend on the Ordinary Share Capital of 10 per cent. (actual), less income tax, payable on January 26, 1952, as against 7½ per cent. last year.

This increase is in furtherance of the company's policy to achieve a more even spread of dividends throughout the year and does not imply an increase in the total distribution for the current financial period.

■

In his review presented at the seventeenth annual general meeting of Glaxo Laboratories, Sir Harry Jephcott, M.Sc., F.R.I.C., Ph.C., chairman and managing director, mentioned the low margin of profits derived from the company's food products, saying that any contribution to the further growth of the company from this part of its business was likely to be of much less importance than that from its other activities.

On the other hand, considerable expansion of operations in the pharmaceutical field had taken place, the manufacture of a number of products previously imported from Germany having been undertaken. Later, the production of streptomycin and vitamin B_{12} was put into operation, and today the main business of the company was in the production of pharmaceutical preparations in which the antibiotics played an important part.

Realising the importance of research, Sir Harry mentioned that the reserve fund for future research and development had been increased in order to secure a continuance of research, even in the years of less profitable trading when the cost of its maintenance might be burdensome.

Although during the year under review the sales at home had increased in money value by only 8 per cent., and in volume by 23 per cent., export sales had increased by 60 per cent. in value and had doubled in volume.

While no falling off in business in the near future was foreseen, continued expansion at the rate experienced during the past few years was not to be expected; indeed, present production resources could not sustain it. Nevertheless, the company had undertaken to spend £1,700,000 at home and abroad on increasing manufacturing facilities, the greater proportion of which would be in the United Kingdom.

A final dividend of 7½ per cent., making a total Ordinary Dividend for the year of 22½ per cent. compared with 17½ per cent. for 1950, was recommended.

■

The payment of a dividend on Preference Shares of 5½ per cent. less tax for the 12 months to June 30, 1951, and of a dividend on the Ordinary Shares of 15 per cent. less tax is recommended in the report of the directors of J. H. Fenner and Co.

OBITER DICTA

● The Russian salmon that is being distributed in Manchester looks as if it has been dragged behind submarines from Russia. —*A suburban grocer.*

● The meat buyer in a London store explains that venison can be cooked like lamb or mutton, but agrees that the method used centuries ago is probably the best.—*"Daily Dispatch."*

● There is a popular idea that children must have sweets and sugar for energy. It's not true. This is not a miserable killjoy condemnation of gums and gobstoppers, for even I must face my children.—*Dr. Charles Hill.*

● World food problems can only be solved by international action and it is to be hoped that the FAO deliberations will convince the member nations of this fact and of the need for a long-term policy.—*J. T. Coe in the "Western Daily Press."*

● Lincoln's Gettysburg address contained 266 words. The Ten Commandments contain 297 words. The Declaration of Independence contains about 1,500 words. But the Office of Price Stabilisation Order fixing prices for cabbages contains 26,911 words. — *Congressman Arthur Miller, Nebraska.*

● The problem is not so much that of the Kremlin as of starvation and poverty. People are no longer content to live on a bowl of rice today in order to fill your larder and mine.—*Mr. Maurice Webb on Communism at a meeting of the Luton Labour Party.*

● Farmers are not producing so much milk now because it is not economical to turn any surplus into butter and cheese. The Ministry of Food and/or Agriculture should allow them to sell butter on the open market in addition to the ration. —*Correspondent to the "Nottingham Evening Post."*

● There is no mystery about the woman's reluctance to buy food in a tube. It isn't that she thinks a tube less healthy than a can or jar, it is just that she has been brought up to associate a can with the kitchen and a tube with the bathroom. The sight of food coming out of a tube makes her think subconsciously of toothpaste. — *A psychiatrist.*

World Food News

Infra-red Rays Cook Meat Balls

Infra-red heat ray tubes for cooking meat balls are used by two United States' firms, the Bergoust-Wilson Co. at Seattle, and the Nu-Trishus Products Corp. at Chicago, with a consequent saving in labour costs, a reduction in waste, and an improvement in uniformity.

Before the installation of these cooking units, the meat balls were cooked on a gas-fired range, as no other method had been found that would give the necessary golden-brown finish. Uniform browning and cooking was a constant problem, many meat balls were broken and made unfit for canning, and heat and grease made the work disagreeable to the operators.

The Chicago unit is a conveyorised stainless steel electric broiler 20 feet long in three sections. Each section has two groups of 20 750 watt heaters with each group individually controlled to vary temperatures. Three parallel 8 inch slat conveyors carry the meat balls through the unit to a can filling station. Warm air above the conveyors is fed to the underside by exhausters to produce uniformity in the cooking process.

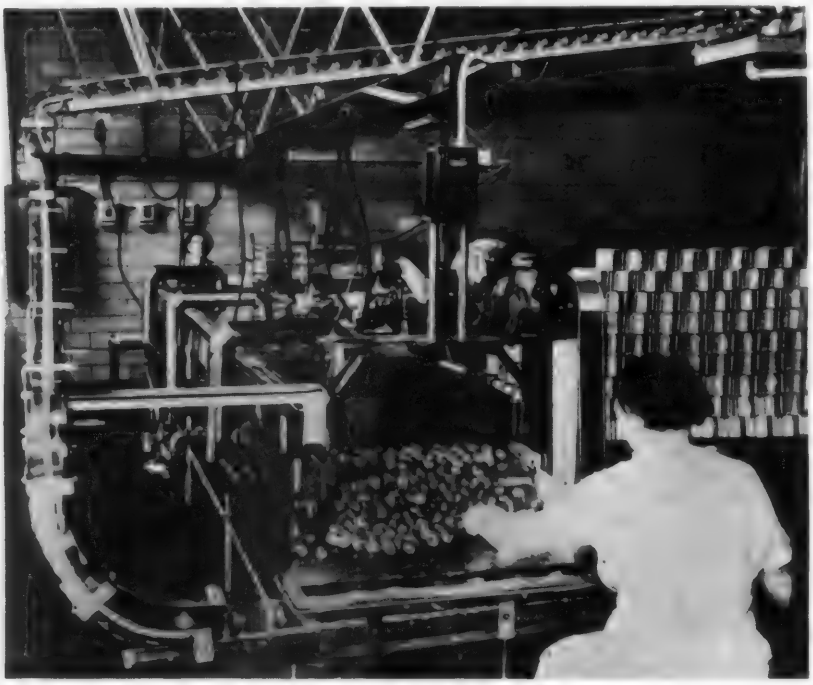
The meat balls are cooked at a temperature of 400° to 500° F. by the heat from as many as 120 heaters. Known as the Merco heat ray tube, the heaters consist principally of a nichrone resistance wire coated with silicon cement which expands and contracts with the metal. The wire is enclosed in a Pyrex brand glass tube with a diameter of 25 mm., from 23 to 47 inches long. The tube emits a multiple frequency ray in short and long infra-red wave lengths, 3¼ to 7 microns, giving a more even distribution of heat than is possible with bulbs. Wave length of the radiation can be adjusted by varying the temperature of the element.

Although the heaters provide a high concentration of energy, the glass surface of the tube remains relatively cool, preventing dangerous contact with grease and allowing fast and easy cleaning at the end of the day.

Only one worker is needed to distribute the automatically formed meat balls evenly on the broiler's three parallel conveyors. She replaces three workers needed in batch cooking. Production has increased from 6,000 lb. in eight hours to 9,000 lb. in seven hours. Working conditions are better, the area being free of unpleasant fumes and cooler than with an open flame.

The Seattle unit, designed by John C. Wilson of Bergoust-Wilson and Judson M. Coats of Merco Industries, is 16 feet long and 15 inches wide, also of sectional construction. A belt conveyor carries the meat balls from the forming machine through a 12 foot cooking area beneath a battery of 72 750 watt Merco tubes, timed to a four-minute cook, operating at the rate of 400 cases per eight-hour day.

The unit carries a connected electric load of 45 kilowatts and is operated by a ½ h.p. motor. Operating cost is considerably less than on the gas-fired range it replaces. Five workers are displaced and the former 5 to 7 per cent. loss in meat balls is eliminated.



As the meat balls emerge from the broiler they are filled into cans.

Australian Meat Project Abandoned

Soaring costs of materials, labour, and other charges have caused the Bovril Company to abandon the construction of its meat extract factory in Katherine, Northern Territory of Australia. The plant is more than half completed and about £(A)250,000 has been spent.

The company stated that the plant was no longer considered an economic possibility. The Federal Government was requested to assist the enterprise, either by a loan or by participating in it as a joint venture. However, it was unable to put forward any suggestion which would enable the project to be completed.

New Zealand Sugar Supplies

Britain has agreed to ensure New Zealand's sugar supplies up to 1958. Under an exchange of letters just concluded with British Ministry of Food will continue to supply until the end of 1952 all New Zealand's raw sugar requirements from its purchases from Commonwealth producers. From 1953 to 1958 the Ministry will supply New Zealand with 75,000 tons of sugar a year.

Mr. Watts, New Zealand's Commerce Minister, said the arrangement assured the country's future sugar supplies at reasonable prices. The actual sugar purchases will be made by private traders.

Smoked Fish

The United Kingdom Trade Commissioner in Malaya has reported that J. H. Vavasseur and Co. (Malaya), Hongkong Bank Chambers, Singapore, desire to contact United Kingdom exporters of smoked fish who would permit them to handle their products on an exclusive distributorship basis. The products concerned are smoked haddock, smoked cod, kippered herrings, etc., which could be exported to Singapore and Malaya under refrigeration.

This company was formed in 1947 and carries on business as general produce merchants. They have branches in Singapore and Kuala Lumpur and hold the agencies for several United Kingdom firms for various commodities.

Firms interested in this enquiry should forward quotations direct to the company.

Refrigeration for Road Transport

Following two years of service tests on three refrigerator trucks in the United States and Canada, the Thermo King refrigerating and heating system is being adopted on a larger scale.

Each refrigeration unit consists of two sections which are held in the space of the ice bunker at the end of the truck. The unit consists of a 28 h.p. engine, a direct-connected Freon compressor, a condenser, and a generator mounted in a single housing, an evaporator unit, and a motor driven air-circulating fan. The power section of each unit is housed in a cubicle which is completely sealed and insulated from the rest of the truck. The unit is mounted on a rolling platform which can easily be pulled out of the truck for replacement.

In the insulated compartment, containing the two evaporators and fans, the air is forced out through ducts under the solid floor, and is directed into the space between the load and the end and side walls of the truck, through which it flows upward, then over the top of the load and back to the air chamber. Where necessary, heat is provided by the equipment working on the "reverse-cycle" or "heat-pump" principle.

Temperature is controlled by thermostat. Controls include starting and stopping the set to meet the demands of the load for cooling or heating, changing the operation as outside temperature rises, and starting a battery-powered electric circulating fan to prevent development of uneven temperatures while the unit is off.

The refrigerating unit can be pushed into its compartment by hand.

Each unit is equipped with an automatic time-regulated defrosting device which goes into operation every five hours. The two units have a capacity of three tons of refrigeration at 10° F.

A box on each side of one end of the truck contains thermometers and a system of signal lights giving the operating condition of both units at a glance. These include indications of the temperature at the top and bottom of the load and the thermostat setting.

Canning Plant for Walvis Bay

Construction of a plant for the production of fish oil, fish meal, and canned fish has been started at Walvis Bay. It is believed that the factory will be the largest fish plant under one roof in the South African Union and South West Africa.

News from the Ministries

Admixture of Imported Flour

The rate of admixture of imported flour has been increased from 7½ to 12½ per cent. in all mills in England and Wales and from 12½ to 15 per cent. in all mills in Scotland and Northern Ireland. These percentages relate to the total product containing admixed flour; flour milled in England and Wales for delivery in Scotland or Northern Ireland will contain the proportion of imported flour appropriate to Scotland and Northern Ireland.

Sliced and Wrapped Bread

The addition that may be made to the maximum price of bread where it is completely wrapped and sealed in either waxed paper or cellulose film will not now be specified by Order. Instead, a reasonable charge for the wrapping and sealing will be permitted provided unwrapped bread is also on sale at the same time.

The present permitted charges of ½d. for the 14 oz. loaf, ¾d. for the 1½ lb. loaf, and 1½d. for the 3½ lb. loaf were fixed in April last and are now in most instances inadequate to cover increased costs.

To enable a baker to meet the demand for sliced bread where he has not the facilities for wrapping in a sealed wrapper, a reasonable charge may now be made for slicing and wrapping it in some other form of wrapper at the customer's request.

The Bread Order, 1951, which has been further amended to give effect to these changes, also now provides for a new brand of gluten bread to be added to the list of breads that can be sold free of price control.

Resignation

Mr. Neville Blond, C.M.G., O.B.E., who has been employed in an honorary capacity by various Departments of State without a break since 1942 and who for the last two years has been Adviser on North American Trade to the Board of Trade gave up this appointment from December 31 in order to be able to devote more time to his private business.

Dried Fruits

The General Licence issued last March allowing the purchase and sale of imported dry mixtures of sugar, dried fruit, and suet or other fat, with or without peel, has now been revoked.

Home-grown Linseed

The sum of £72 per ton *ex* farm is now paid by the Ministry of Food for home-grown linseed of 90 per cent. purity bought for crushing. For seed of greater or less purity the price will be adjusted in the usual way.

Import Licensing Restrictions

Licences are now required for the import, from Muscat and Oman, and countries other than the sterling area, of various goods, among which are chutney, canned fish (except herring) products, flavoured syrups in bulk containers, loganberries, paw paws, and ugli fruit. Licences are not required for these goods if they were actually in transit on November 16.

Invert Sugar

The Invert Sugar Order, 1951, which came into force on January 1, 1952 and replaces with amendments the Invert Sugar (Maximum Wholesale Prices) Order, 1943 as amended, makes the following changes:

1. The maximum wholesale price of invert sugar is increased by 1s. a cwt.

2. Manufacturers may make an additional charge of 1s. 1od. a cwt. for invert sugar delivered in ¼ cwt. containers at the buyer's request.

Food Standards in Operation

The Food Standards (Fish Paste) Order, 1951, and the Food Standards (Meat Paste) Order, 1951, which prescribe standards of composition for fish paste and fish spread and meat paste and meat spread, respectively, came into force for sales by manufacturers on September 7, 1951, and for sales by wholesalers on December 7, 1951.

The Minister of Food has now made the Food Standards (Fish Paste) (Amendment) Order, 1951, and the Food Standards (Meat Paste) (Amendment) Order, 1951, appointing March 7, 1952, as the operative date for the application of the above mentioned standards to all sales.

*

The Food Standards (Edible Gelatine) Order, 1951, which prescribes a standard of composition for edible gelatine came into force for sales by manufacturers on August 1, 1951, and for sales by wholesale on November 1, 1951.

The Minister of Food has now made the Food Standards (Edible Gelatine) (Commencement) Order, 1951, appointing February 1, 1952, as the operative date for the application of this standard to sales by retail.

Prevention of River Pollution

The Rivers (Prevention of Pollution) Act, 1951, will now make it possible for River Boards to safeguard the quality of rivers which are not already polluted and to secure gradual, but distinct, improvements to those streams, particularly in industrial areas, which receive large volumes of trade wastes. For the first time local authorities, industry, and traders can be provided under the procedure laid down in the Act with clear and precise information about the conditions which must be satisfied when effluents are discharged into streams.

In a circular addressed to all River Boards and local authorities the Minister of Housing and Local Government expresses the hope that improvements can be made while interfering as little as possible with the nation's industrial economy. He recommends close personal contacts between river authorities and those local authorities and industrialists who are preparing schemes which will necessitate new discharges into rivers. In this way proper measures for treating effluents can be adopted at an early stage, so that costly recasting of plans can be avoided.

It is considered too early to give advice on the drafting of standards needed to ensure that effluents are acceptable, but the production of a document embodying conclusions reached is promised at a later stage.

The powers under the Act will be exercised by the Thames Conservators, the Lee Conservancy Catchment Board, the Metropolitan Borough Councils, and the River Boards set up under the 1948 Act.

Chocolate and Sugar Confectionery

The Chocolate, Sugar Confectionery, and Cocoa Products (Amendment No. 2) Order, 1951, raises from 5s. to 5s. 10d. a lb. the highest price that may be charged for sugar confectionery; this change will affect only a very few lines of sugar confectionery which are in the highest of the existing price groups. It also provides for a revised definition of chocolate couverture.

Under the new Order, chocolate couverture means any chocolate product that would be regarded in the chocolate industry as properly sold under the trade descriptions of chocolate couverture, bakers' covering compounds, unsweetened chocolate, neat work, chocolate vermicelli, or chocolate granulettes.

Traders who sell chocolate couverture are reminded that a number of chocolate products sold under various descriptions, such as "chocolate coverings," may come within the definition of chocolate couverture and consequently may not be sold unless classified for price control purposes. Any trader who is in doubt whether a particular chocolate product (either home-produced or imported) is chocolate couverture should consult the Ministry of Food, Bakery and Confectionery Division, Government Buildings, London Road, Stanmore, Middlesex.

Raisins from America

The surplus of the U.S.A. 1951 raisin crop, estimated at 30,000 tons, has been purchased by the Ministry of Food. Shipment should begin at an early date, but supplies will not begin to reach the United Kingdom until some time in the New Year.

British Commonwealth Sugar Agreement

MARKETING PLANS AND PRICES ANNOUNCED

A multilateral Agreement with the British West Indies Sugar Association (Inc.), the Queensland Sugar Board, the South African Sugar Association, the Mauritius Sugar Syndicate, and the Colonial Sugar Refining Co., Ltd., for Fiji, has been signed by the Minister of Food.

Based on general understandings reached during discussions in 1949 and 1950, the Agreement comes into force at once, and is in some respects retrospective to January 1, 1950. It will run until the end of 1959, and provision is made for successive annual extensions of one year. Producers will, therefore, be able to plan in the knowledge that this contract will run for eight years ahead.

The Agreement deals with the whole of the sugar exports of the Commonwealth countries concerned. It is designed to secure, among other things, the orderly marketing of Commonwealth sugar up to a total of 2,375,000 tons a year, of which 900,000 tons has been allocated to the British West Indies and British Guiana; 600,000 tons to Australia; 470,000 tons to Mauritius; 200,000 tons to South Africa; 170,000 tons to Fiji; 25,000 tons to British Honduras; and 10,000 tons to the East African territories. British Honduras and East African territories have not signed the present Agreement, but provision is made for their accession later, and also for that of St. Vincent with a quota of 1,500 tons.

Of this sugar the United Kingdom has undertaken to buy 1,568,000 tons, and New Zealand 75,000 tons at a uniform Commonwealth price which shall be reasonably remunerative to efficient producers. A method of determining this price for each year is provided in the Agreement.

The balance of the sugar not sold at this negotiated price may be offered for sale competitively in the preferential markets of the United Kingdom and Canada. The Ministry of Food will cease to be responsible for the sale of Commonwealth sugar to Canadian refiners after the end of 1952. Commonwealth producers will then resume direct contact with their Canadian customers through their normal trade channels for the first time for twelve years.

A further review of export quotas, including the amount of sugar to be purchased at the negotiated price, will be undertaken in 1953.

The Commonwealth price for 1952 has been agreed at £38 10s. a ton, an increase of £3 12s. 6d. over the 1951 price.

Provision for linking the Commonwealth Sugar Agreement with an International Sugar Agreement is also made in the Agreement. Until such time as an International Agreement is negotiated, producers will be free to expand their sales to non-preferential markets without limitation.

Information and Advice

Albumen Nougat

B.5522. *Would you please let us have the necessary details for the manufacture of nougat using albumen.* (Lancs.)

The following recipe is given as a basis for trial:

Granulated sugar	56 lb.
Corn syrup	56 lb.
Albumen	15 oz.
Fine coconut	10 lb.
Vanillin	1 oz.

The albumen is dissolved in 3 pints of water, whipped in a rapid whisking machine just before use, and placed into the nougat beater while in motion. The sugar and corn syrup are cooked to 265° F., and poured gradually into the beating machine. Beating is continued until the mixture is light and firm, then the coconut and vanillin are added. The ingredients are allowed to mix well, then discharged to oiled and well-dusted pans, and transferred to wafer-paper lined, or oiled and dusted cooling slabs. When sufficiently cool the batch is divided into cakes and cut on the nougat-cutting machine. Apart from the flavour angle, desiccated coconut assists cutting.

Lemon Cheese

B.5523. *We should be much obliged if you would let us have a recipe for lemon cheese.* (Yorks.)

The following formula may be used as a basis for trial:

Water	10 lb.
Sugar	29 lb.
Glucose	26 lb.
Margarine	15 lb.
Cornflour	3½ lb.
Frozen egg albumen	3½ lb.
Agar-Agar	½ lb.
Egg yolk	1 lb.
Citric acid	4 oz.
Oil of lemon	3 oz.
Colouring	

The water, sugar, and glucose are heated to 240° F. and the other ingredients, with the exception of margarine, added. The cheese is brought to the boil, the margarine is added and the whole passed through a strainer of about 30 mesh, run into containers, and allowed to cool. This product has the advantage of not running over in the oven.

Dehairing Pigs

B.5524. *Would you please let us have some information with regard to dehairing pigs.* (Devon.)

The ideal temperature for scalding is between 145° and 150° F. On large plants this temperature is thermostatically controlled, the water being heated by steam. About five minutes is sufficient to loosen the hair and make its removal with the scurf a reasonably simple operation. Some variation will occur, depending on the breed of pig and the rearing conditions. Scalding tanks are usually equipped with a cradle, which enables the pigs to be removed prior to scraping.

Most of the smaller establishments depend upon scalding tubs, and a mixture of three parts boiling water to one of cold is considered to provide the correct temperature. Here, however, the ratio of the weight of the pig or pigs to the water, and heat losses owing to the difference in the atmospheric temperature, all play a part. It is sometimes considered that a temperature sufficient to change the colour of blood from red to brown is satisfactory, while some operators dip their finger into the scald twice; the second dipping should sting the finger. In this class of slaughterhouse it is very rare to see a thermometer employed. Should the temperature be too high, the hair will become "fixed" and extremely difficult to remove.

Where hard water is employed it is sometimes the practice to add a small quantity of slaked lime.

Scudding or the removal of the hair can be carried out in dehairing machines in which the pigs revolve and beaters remove the hair, or it may be carried out by hand.

A recent development for dehairing in one operation is by immersing the pigs in a hot, adhesive mixture, and on removal from this bath the coating is permitted to become semi-plastic. This substance is then peeled from the surface of the pig, removing with it the hair, including the roots. This produces a very clean skin with a minimum of labour. After use, the adhesive is melted, strained to remove the hair and scurf, and returned to the dehairing tank. It is stated that over a period of nine months' operation 1¼ oz. of adhesive per hog had to be replaced.

Peanut Butter

B.5525. *We shall be glad to receive details concerning the manufacture of peanut butter.* (London.)

In the continuous process the groundnuts are shelled, cleaned, roasted, blanched to remove the skins, hand-picked to remove discoloured or rotten nuts and extraneous matter, ground, and filled into airtight jars. About 2 per cent. salt is added before the nuts enter the grinders. Hydrogenated fat or glycerine may be added to prevent oil separation, and lecithin or antioxidants to control rancidity. Malt, orange, ham, cheese, or other flavours may be added.

An important point in the production of peanut butter is to prevent oil separating out on storage. Oil separation is greatest in finely ground peanut butter. Storage at low temperature is more advantageous to prevent oil separation than storing at about 50° F. or above.

Chocolate Liqueurs

With reference to the formula for chocolate liqueurs published on page 41 of the January issue of FOOD MANUFACTURE, advice should be obtained before deciding on the actual wording on the label or description of the product when offering it for sale to the public. A firm was recently convicted for selling chocolates falsely described as liqueur chocolates which contained no alcohol.

Information Supplied

The Enquiry Service has dealt with requests for the names of manufacturers and suppliers of plant, machinery, and materials, and also general information as follows:

B.5482. *Fondant, sweetened fat, and apple juice.* (Belgium.)
B.5485. *Worcester sauce.* (Herts.)
B.5486. *Cheese straws.* (North Wales.)
B.5490. *Potato crisps.* (London.)
B.5491. *Gelatine capsules.* (London.)
B.5494. *Can coding ink.* (Ireland.)
B.5497. *Literature on vegetable juices.* (India.)
B.5500. *Popcorn.* (Glam.)
B.5502. *Ice cream.* (Bucks.)
B.5503. *Heat penetration.* (Leics.)
B.5505. *Production of enamelware.* (N. Ireland.)
B.5506. *Shredded suet.* (Ireland.)
B.5507. *Drums for fat.* (Fiji.)
B.5509. *Mixing machine.* (Lancs.)

Recent Patents

662,760. CARTER, R. J. S., and MCDONALD, H.: Milling process for natural grains or seeds including fling impacting in breaking and finishing operations.
662,873. ILFORD, LTD.: Wrapping papers.
662,986. SANGSTER, G. B.: Machine for clinching lids on cans.
662,993. CUSTANCE, J. C.: Device for use in baking.
663,049. MARS, INC.: Candy dispensing machines.
663,052. DALE REFRIGERATING CO.: Apparatus for cooling liquids.
663,098. SHERWIN-WILLIAMS CO.: Preservation of proteins and proteinaceous materials.
663,230. ABBEY, A. (Aktieselskapet Lysosund Sildolje- and Kraftforfabrik): Process for making fodder meal and oil from animal raw materials, for example, from fish such as herrings, from mammals such as whales, or from animal and fish offal.
663,254. SCHWARZ, H. W., HELLIER, E. G., and SCHROEDER, A. L.: Process of preparing dried coffee extract.
663,860. IDEAL CAPSULES, LTD., and RAILTON, D. E.: Production of foil capsules for bottles and containers.
663,890. DRUMMOND, R. H.: Apparatus for treating dough to prevent adherence of same to baking tins and plates during baking operations.

Abstract of Patent Specification

Treatment of Cereal Flours

This invention relates to a process for treating cereal flours to reduce their enzyme content.

Cereal flours contain a number of enzymes which have various effects on the flours. Many of them have undesirable effects causing decomposition on storage. In particular lipase and similar enzymes, by degrading the fat in cereal flours, or mixtures containing such flours, initiate reactions which finally result in the production of rancidity. Diastatic enzymes cause degradation of the starch. The production of acid products during the storage of cereal flours can also be caused, *inter alia*, by enzymic action.

Lipase, in common with other enzymes, is inactivated by heat. In the case of cereal flours, however, it is difficult to apply the heat so that, although the enzymes become inactivated, the baking qualities or other desirable characteristics of the cereal flour remain unaffected as a result of this heat. Ordinary heating methods, by which heat is applied externally, do not, in the case of cereal flours, result in a uniform increase of temperature, some parts being overheated and others being relatively unaffected.

It has previously been proposed to make starch degradation products by subjecting starch-containing material, such as flours, to dielectric heating at high frequencies between the plates of a condenser.

It has now been found that by careful control of temperature and time the enzyme content of cereal flours may be reduced substantially, without the undesired formation of starch degradation products.

The present invention provides a process for treating cereal flours to reduce their enzyme content, wherein the cereal flours are subjected to dielectric heating at high frequencies between the plates of a condenser until the temperature has risen to a value within the range 70°-110° C., the conditions being such that the said temperature value is reached within a time not greater than ten minutes.

By means of the process the enzymes are inactivated to such an extent that the keeping qualities of the flours and products containing these flours are improved to a marked degree.

The cereal flours may conveniently be subjected to the heating while travelling on a conveyor band.

Preferably the flours are subjected to the heating until the temperature has risen to a value within the range 90°-100° C., the conditions being such that the said temperature value is reached within a period of from two to four minutes.

661,461. *Reckitt and Colman Limited and John William Corran.*

Trade Marks

HONIFLUF.—698,779. Teacakes and biscuits, all containing honey. **Thomas Parkinson, Limited,** Watery Lane, Preston, Lancashire; Manufacturers.
CAP D'OR.—699,376. Mixed cut drained peel, the basic ingredients of which are orange, lemon, citron, and grapefruit peel. **Richardson's Citrus, Limited** (a Company incorporated under the laws of the Union of South Africa), The Richardson Building, Market Square, Port Elizabeth, Union of South Africa; Merchants.
REDIMARCI.—699,865. Marzipan. **Gordon Walker and Company, Limited,** Basingstoke Road, Reading, Berkshire; Manufacturers and Merchants.
LIGA.—701,209. Dietetic foodstuffs and foodstuffs for infants. **Liga Fabrieken N.V.** (a Limited Liability Company organised under the laws of the Netherlands), Z.O. Singel 43, Bergen op Zoom, Holland; Manufacturers and Merchants.
AMBASSADOR.—701,217. Meat and meat extracts, and fish, poultry, and game (other than live fish, poultry, or game). **Estrades, Limited,** 66, Leonard Street, London, E.C.2; Manufacturers and Merchants.
DOMINIO.—695,539. Meat, fish, poultry, fruit, and vegetables, all being canned, bottled, and preserved goods; and soups and jams, all being canned and bottled goods. **John Heath (Canners), Limited,** New Road, Pershore, Worcestershire; Merchants.
TANGO.—699,784. Non-medicated confectionery, but not including sweets or chocolates. **British Canners, Limited,** Widemarsh Street, Hereford; Manufacturers.
BLANSHIES.—700,333. Non-medicated confectionery. **Kenyon Son and Craven, Limited,** Morpeth Street, Rotherham, County of York; Food Manufacturers.
HEADMASTER. — 700,455. Biscuits (other than biscuits for animals). **Embisco, Limited,** 8, Weir Road, London, S.W.12; Manufacturers and Merchants.
MALTABELLA.—701,666. Malted cereal breakfast foods. **Hind Bros. and Company, Limited** (a Joint Stock Company incorporated under the laws of the Union of South Africa), The Garden Factory, Umbilo, Natal, South Africa; Manufacturers.

Recent patents and trade marks have been selected from the "Official Journal of Patents" and the "Official Trade Marks Journal" and are published by permission of the Controller of H.M.S.O.

New Companies

Bouquet (Juices), Limited. (500922.) 23, Essex Street, Strand, W.C.2. To carry on business of fruit, potato, and vegetable growers, market gardeners, importers, exporters, and manufacturers of and dealers in fruit and vegetables, bottled and canned fruits, and juices, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: Catherine M. Roberts, Flat 2, 39, Elvaston Place, South Kensington (secretary); S. M. Kester, 68, Roxborough Avenue, Osterley, Middlesex (clerk).

Monmore Box Company, Limited. (501203.) To carry on business of manufacturers of and dealers in boxes, crates, cartons, containers, etc. Nom. cap.: £100 in £1 shares. Dirs.: not named. Subs.: C. H. Lea and G. C. Roberts (solrs.), 106, Colmore Row, Birmingham.

Pietro Negroni, Limited. (501206.) 30, Bridle Lane, W.1. To carry on business of manufacturers, general merchants, importers, and exporters of salami, meat, meat products, etc. Nom. cap.: £1,000 in £1 shares. Dir.: Dr. P. Negroni, 4, Via A. Aglio, Cremona, Italy.

Rand Food Imports, Limited. (501322.) Nom. cap.: £1,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: Vera C. Ullmer and Doris E. Aimes, 73, Basinghall Street, E.C.2.

Packaging Machines, Limited. (501660.) 74, Newman Street, W.1. Nom. cap.: £1,000 in £1 shares. Dirs.: K. D. Morgenstern, 18, Lyttelton Road, N.2; J. K. K. Howat, 22/24, Northwood Hall, N.6.

Walter C. Gibbs and Son, Limited. (501678.) 6 and 7, Wood Street, Stratford-on-Avon, Warwicks. To carry on business of manufacturing bakers, cake and biscuit makers, confectioners, etc. Nom. cap.: £3,000 in £1 shares. Permt. dirs.: W. C. Gibbs, 1, Avenue Road, Stratford-on-Avon; W. H. Gibbs, 6, Wood Street, Stratford-on-Avon.

Food Connoisseurs, Limited. (501820.) 82, Queen Street, E.C.4. To carry on business of manufacturers of and dealers in foodstuffs, etc. Nom. cap.: £100 in £1 shares. Permt. dir.: A. Cunningham, Groville House, Chorleywood Road, Rickmansworth.

Citrus Juices and Oils, Limited. (501852.) Nom. cap.: £100 in 1s. shares. Dirs.: L. G. Tongue and Mrs. H. Tongue, 7, Lingards Road, Lewisham, S.E.13.

Naumann Sales Agency (London), Limited. (502147.) 154/6, Fenchurch Street, E.C.3. To plant, grow, import, manufacture, blend and deal in tea, coffee, cocoa and other Eastern and Colonial products, etc. Nom. cap.: £100 in £1 shares. Dirs.: F. J. Lydall, Pin Cottage, The Clears, Reigate, Surrey; E. H. E. Lydall, The White House, Beeches Close, Ringwood, Surrey.

Unified Suppliers, Limited. (502164.) The Cedars, 62, Springfield Lane, Ipswich. To take over business of buyers and sellers of foodstuffs and merchandise now carried on at Ipswich by The Ipswich Grocers Central and Eastern Buying Groups. Nom. cap.: £1,500 in £1 shares. Dirs.: S. W. Brewer, 41, St. Matthews Street, Ipswich; L. G. Bush, 202, Cauldwell Hall Road, Ipswich; and A. W. W. Hicks, A. C. Hiskey, and G. Peters.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.